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THE COLOR COMPUTER MONTHLY MAGAZINE

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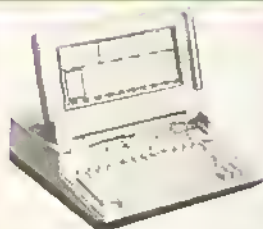
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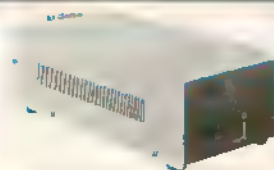
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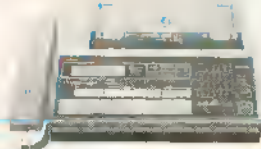
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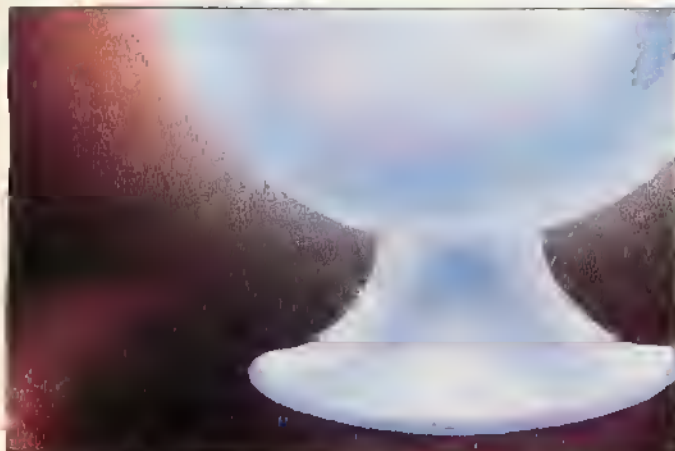



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Cover Illustration
by Fred Crawford

Letters to the RAINBOW

Foreign Characters

Editor:

I am a missionary in Quito, Ecuador. During 14 years of service here, the last seven have been enhanced through the use of Color Computers. I brought the first one here in 1982 and it continues to operate to this very day in our Bible Institute. I upgraded it from 16K to 64K myself. I learned BASIC, assembly language, OS-9 and much more with that old gray machine. It cost an arm and a leg at that time, but it has been worth it.

Since then, I have greatly computerized our work here, using only Color Computers. There is a CoCo system in every major ministry of our church — our boy's home, recording studio, book store and Christian Book distribution. Our maximum configuration is a CoCo 3 with 512K, a 15-Meg hard drive, OS-9 Level II and CM-8 monitor. It is used to maintain the entire operation and inventory of over 1500 different Christian titles.

Because of the isolation that we live in, even mail can be delayed many months. (I just received the November issue yesterday.) Sometimes mail doesn't even make it, which is very discouraging when one has paid more than double the subscription price just for postage. After living here so long, I consider the U.S. postal system to be one of the wonders of the world. People who complain about it should be sentenced to one year in a third-world country.

The days are gone that I can take the luxury of typing in long and powerful programs. Have all the talented programmers abandoned the CoCo world? Only programmers can make the Color Computer the machine it should be!

There is very little, if any, superior programming for the CoCo 3. There isn't even a really decent database. Simply porting programs over to the 80-column screen and speeding them up is an insult to the power built into the CoCo 3.

I used a modified version of *VIP Writer* (one that I modified myself) that produces Spanish letters on its graphics screen which correspond with my printer's Spanish characters (Okidata 192). I have not upgraded to the new version of the program because I don't want to take the time to repeat the work of modifying it.

IBM clones, and even the Tandy 600, provide the IBM G2 character set which works on most of our printers. It makes

writing in Spanish so easy. Bill Barden's article on teaching the CoCo 3 the Tandy 1000 character set (which is essentially the same as the IBM G2), was very well done. Thus, a CoCo 3 could produce Spanish documents on a G2 printer and display them simultaneously on the screen. Doing so from BASIC doesn't interest me though, and what I gather from the new CoCo 3 word processors, there is no indication that any of them make the work of writing in a foreign language any easier. Only software that gives intelligent support for foreign language characters, such as IBM's G2 standard using 8-bit data, will ever become very popular outside the USA. Isn't there any demand for foreign language characters within the U.S. borders? I understand that foreign languages are still being taught in both high school and college. *Max-10* looks nice, but it doesn't support G2 characters. Even Tandy printers now support G2!

It is far less important to the majority of buyers in a foreign land, if the program speaks another language (prompts in Spanish) than it is if the program produces foreign language (the final product).

I like the CoCo! It is a cheap computer with great value. What I ask of it does not require any new hardware. I only ask that consideration be made [for foreign characters] while developing programs — especially word processors, databases and spreadsheet programs. It should be as much a part of OS-9, as it is a part of MS-DOS.

Reverend Kepler Nigh
Quito, Ecuador

The Best Kept Secret . . .

Editor:

Just a while ago, I was at a computer store talking to one of the salesmen who sells many different brand names — Atari to Samsung. I mentioned to him that I had a CoCo 3 and was learning OS-9. I asked him if he was familiar with OS-9, and he said, "No."

I told him that it was a UNIX-like operating system. He was stunned. The look on his face was worth many "bytes." He asked me, "Are you serious, UNIX has multitasking capability?"

I told him that OS-9 did, too. He couldn't believe the CoCo could do that. Five minutes later, he was still shaking his head. He just couldn't get over the fact that the CoCo could run an operating system similar to UNIX.

The CoCo 3, unfortunately, is the best kept secret.

Fred Lajoie
Kentville, Nova Scotia

BACK TALK

Editor:

With regard to the query by Al Bilinski (of Selkirk, Manitoba) who wanted to run *DynaCalc* on the CoCo 3: Australian Peripheral Developments can provide a working version of the RS-DOS *DynaCalc* which will run on the CoCo 3.

Simply forward your original master disk along with \$30 to the address listed below. The master disk will be returned with a working *DynaCalc* disk for the CoCo 3, and instructions for making backups.

John Poxon
Australian Peripheral Developments
94 Chatswood Road
Slacks Creek, 4127
Australia

HINTS & TIPS

Editor:

I have been an avid RAINBOW reader and CoCo programmer for about six years now. I started out on a 16K ECB CoCo 2, quickly upgraded to 64K, two SSD drives, CGP-115 and DMP-105 printers, Deluxe RS-232 Pak, Orchestra-90 synthesizer, etc.

My chief reason for selecting a CoCo, other than the price, was the outstanding graphics capabilities. So, naturally, when the CoCo 3 became available, I had to have one!

I have been especially delighted with several programs and articles in RAINBOW about replacing HSCREEN character sets with customized fonts, particularly Eric Wolf's *Font Master* (October '88, Page 41). After hand-entering four or five font sets, I discovered that I could load my old *McPaint* and *Graphicom* fonts into memory with an offset of &H749D, then resave them with start, end and exec addresses of &HF09D, &HF49C, &HF09D, respectively. Then they can be loaded directly into memory for HSCREEN use, or by *Font Master* to be edited.

Some of my old fonts were saved as binary data files, rather than machine language files, i.e., 1 B 1, instead of 2 B 1. With these, I cheated and used *GregEterm* to load them one by one, then resave them as machine language programs, which then

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allowed me to offset, load and resave them in a useful format.

I hope this information can be of some use and save others the wear and tear on keyboard and fingertips I was experiencing.

Keep up this outstanding publication.

Mike Hungerford
Escondido, California

INFO PLEASE

Editor:

I usually know a good deal when I see one, but . . . six months ago I logged on to the CoCo Master's BBS (whose number was published in RAINBOW) and made a deal to purchase two double-sided drives (which were advertised on the board) from the SysOp, George Proulx. At my request, I asked him to add a case, power supply and cable, and told him I would pay for the extra parts and labor involved. He agreed. The total cost of this equipment was \$215. The drives were paid off in November. Now for the problem.

I contacted Mr. Proulx over the BBS, constantly asking him when he would be finished with my drives. He kept telling me they were just about done. Toward the

middle of January, I contacted him again. This time he said they would be shipped to me within the next week. However, that was the last I've heard of him.

Since then he has taken his board down, changed his phone number, and I found out today that he has moved. What am I to do? I worked hard flipping burgers to pay for those drives! Any information on the whereabouts of this bum will be quite helpful and appreciated.

Peter Bott
1103 School Street
Jin Thorpe, PA 18229

Diet Management

Editor:

I own a 64K CoCo 2 with one disk drive and would like to correspond with other CoCo owners who are diabetic. Anyone who is into programming who would like to assist me in writing a computer program to help manage a diabetic diet can write or call me.

Donald J. Floodeen
611-112 2nd Ave. SE, #1
Aberdeen, SD 57401
605-225-9707

BUYER BEWARE

Editor:

I am writing to let you and your readers know of the gross lack of responsibility of one of your advertisers — Diecom Products, Inc. of Milton, Ontario. I am not the only one who has experienced major problems with this company which are as follows:

First of all, in the past, Diecom has advertised software before it was *actually* available. I called to order *Mission Rush '11 Assault* and was told the game would not be available for two weeks, however, it had been advertised in THE RAINBOW two months prior to my call. *Medieval Madness* was not available until three months *after* it was advertised in your magazine.

Secondly, Diecom has been running its business from an answering machine, although the ad states "Personal Service 9-5 E.S.T." On January 10th I called and left a message regarding software availability, but no one returned my call. I called again on the 21st and on the second of February, still no returned calls. I decided to order *The RAT* package, especially after reading your reviewer's comments, and this is where my major problem began.

The RAT, designed for 128K and 512K machines did not work with my Tandy 512K upgrade. So what did I do? I called

. . . silly me. Of course, they still haven't returned any of my calls. I had to go out and buy a new 128K CoCo 3 just to use the program. However, I still cannot use it to its full potential. A friend of mine experienced the same problem. He called Diecom several times also. We've both given up.

This brings me to my final complaint: I am writing a CoCo 3 adventure using *The RAT* to create the graphics screens, but I ran into a bug in my program where the saving/loading routine was causing conflicts. This time I wrote to Dave Dies, asking whether a new save/load routine is available for *The RAT*. (These are available for *Color Max 3* and *CoCo Max III*.) To this date (March 17), I still have not heard from Diecom.

I own my own business and I *know* you *must* return calls and *must* support what you sell. Otherwise, you won't last. For this reason, I'm surprised Diecom has lasted as long as it has!

J.T. Rawlinson
Toronto, Canada

Diecom Products, Inc. has ceased advertising its products in THE RAINBOW, effective with the November '88 issue. We suspect that it is no longer in business.

More Suds?

Editor:

I am in charge of maintenance for a commercial laundry, and I was wondering if you or any of your readers know of any software designed for maintenance reporting and scheduling. I have a CoCo 3, 128K, one disk drive, and printer.

Tom Boyesen
1456 Elsie Court
Santa Rosa, CA 95401

REQUEST HOTLINE

Editor:

A while ago I wrote about hooking up the CoCo to a device on an overhead projector, showing a computer display to an entire class. The HJL monitor adapter has proved to work like a charm. Other adapters work under OS-9 programs in the graphics modes, but HJL does it all. Unfortunately, one solution led to another problem.

The Goldstar monitor sent with the adapter did not function. After plugging and trying all kinds of equipment, the long and short of it was that the CoCo and the Goldstar monitor did not work together. HJL has been very cooperative throughout and is sending another monitor. The HJL monitor adapter is a tight fit on my CoCo but is working well. The problem seems to be a slight incompatibility between the signal from the computer and the monitor. One or the other is a bit fussy about the signal. The reason the equipment works in some configurations was explained to me this way: Some equipment is more "forgiving" and can handle slight differences in signals.

When I was content with my b/w television, monitors were not in the picture. Buying an \$88 monochrome monitor from Howard Medical changed all that. Would you and your technical staff consider doing some informational work on monitors in the future? I would like to have a more technical base to work from besides plugging and switching equipment.

The main reason for switching is to avoid interference. The clarity of the color display is nice, but the majority of what I do is word processing or programming, for which a monochrome display is fine. My activities in the classroom include Logo, beginning programming and keyboarding. The CoCo, via the PC Viewer is making its way more into math classes. Teachers are missing out on a low-cost alternative if they don't give the CoCo a chance. One improvement I am waiting for is a way to attach the disk drive cable permanently to the computer. Most of my trouble-shooting involves unplugging/plugging in the disk drive controller. The disk drive connection

Word Power 3.2

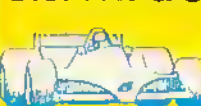
"... friendly...amazing execution speed...much easier to use than VIP software & 2 other word processing systems I've tried...very user-friendly...massive text storage capacity...highest among word processors..." - Rainbow Oct. 88 Review for Word Power

"... Just think of any word processing feature---chances are very likely that *Word Power* has it ... packs a lot of features ... excellent word processor..." - Rainbow's Word Processor Comparison Article "Deciding What's Right For You" April 1989 Rainbow; Page 26.

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is a definite weak link in a classroom with a lot of users.

I'd also like to know the best way to get a better electronics background in order to eventually use the CoCo with robotics in the classroom.

*Michael Franich
Lakeridge Jr. High School
5909 Myers Road
Sumner, WA 98390*

Thanks for the suggestion! Some hackers have made a short (1 to 2 inch) ribbon cable to go between the cartridge port and disk controller. Once installed, they can put the controller right in the CoCo's case to keep it safe and out of the way.

Mistaken Identity

Editor:

We'd like to ask your help in straightening out a potentially damaging case of mistaken identity.

On March 27, the *Wall Street Journal* carried a story about abuses of 900-number information services by unscrupulous information services operators. One such operator was identified, in bold type, as Delphi Corporation.

The company, of course, has nothing to do with us [DELPHI — General Videotex Corporation]. However, we have been getting telephone calls, mail messages and other feedback that indicates that there is considerable confusion in the minds of the public about the issue.

We have been in contact with *The Journal*. We suspect, however, that the confusion is spreading rapidly beyond readers of the *Wall Street Journal* to computer users in general.

If you have the editorial space available, where you could mention the fact that our DELPHI has nothing to do with this Delphi Corporation of New York, it would be greatly appreciated.

Thank you for your help.

*Wes Kussman
DELPHI Chairman
Cambridge, Massachusetts*

OS-9bow?

Editor:

I have been a subscriber to the RAINBOW, off and on, since I bought my first CoCo in 1984. In the beginning I was thrilled with each issue. I spent hours typing programs into my computer, saving them to disk, running and debugging them, etc. Once in a while, I'd find a game that I liked, wear it out, learn how to win it every time, and then move on to my next favorite.

When I finally got fed up with typing

BASIC programs, I started typing in the ML listings with the little BASIC ML loader from your pages, then with an assembler. I got frustrated soon because somehow I couldn't get the ML programs to run. I decided that ML wasn't my cup of tea and moved on to the greener grass of OS-9.

When I got OS-9 (Level II) I was continually told to refer to such-and-such a page in the red manual (Level I type), because everyone assumed that I had Level I first. Well, I didn't, and I still don't. Dale Puckett's column seems, at first glance, to be informative, but there are many times when I find references to Level I processes that aren't included in Level II, which makes much of the information contained therein to be of no real value to me.

My point is that I'd like to have the kind of excitement under OS-9 that I found with BASIC programs in the beginning. What I find in the RAINBOW, though, is 90 percent BASIC, 9 percent other and 1 percent OS-9. While my figures are, admittedly, bogus and exaggerated, you get the drift. How about an annual OS-9 issue to augment the annual Beginner's/Communication, etc., issues? If that's not possible, how about a subsidiary publication for OS-9 addicts? Call it OS-9bow or something, but cram it full of beginning, intermediate and advanced OS-9 projects. Teach us how to write processes, use the system, modify it for our own needs, grow into it, and even generate other programs for the OS-9 community.

*William A. Smith
Charleston, South Carolina*

See Lonnie Falk's "PRINT#-2," column on Page 10 of the May '89 issue for an explanation on why it would not be feasible to print a strictly OS-9 magazine.

As more OS-9 users become comfortable with using the operating system, we will receive more submissions on OS-9, and therefore, will have more information available to share with the CoCo community.

Attention OS-9 users and programmers: If you have experience using the OS-9 operating system, we desperately want your submissions!

KUDOS

Editor:

I have been an avid reader of RAINBOW since December 1985. It was your magazine that convinced me to purchase a Color Computer. Thanks for making a kids' toy into a computer that is more than just kid's stuff. I am writing because of the bold new direction your magazine is taking. In both your March and April issues, you have taken an area of interest to the CoCo com-

munity and done an in-depth comparative article on it. It was hard drives in March and word processors in April. This is the kind of information available in the MS-DOS community but has been scarce in the realm of the Color Computer.

Most readers do not have the resources to compare products themselves. Some are lucky enough to have access to the RAINBOWfests or to computer clubs where they can see the equipment or software run, but most of us are not that fortunate. I applaud your fine efforts in this area.

Keep up the good work. I can't wait to see an article on spreadsheets.

*Jim & Lin Schulte
Tell City, Indiana*

The Write Stuff

Editor:

Kudos to Dale Rickert and Simply Better Software's word processor, *Simply Better*. Kudos also to Cray Augsburg for his fine review, which led me to purchase the program.

Not only did I get immediate service from SBS, I got a long, informative conversation with Mr. Rickert, a personal touch that gave me confidence to buy from a new company!

I have tried close to a dozen CoCo word processors, and this one beats them all. It has features (like sorting and index and table of contents production) that I had only thought possible on programs costing 10 to 20 times more! Mr. Rickert has come down firmly on the side of reasonably priced, yet powerful software. At \$29.95 there should be no reason at all for this product to ever show up on the "pirating networks."

Let's see more software of this kind and more of those comparative and highly informative articles, such as THE RAINBOW has run on hard drives and word processors.

*Allen A. Klein
(subscriber since 1981)
Highland, West Virginia*

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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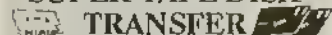
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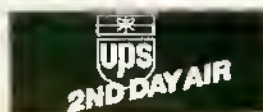
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... Something Akin to a Miracle

I went to the roadshow version of the Broadway play *Beehive*, appearing here in Louisville a few weeks ago. Following the show, I got into a discussion with some of those who attended with me about how it was unfair to try to capsuleize a decade into a neat little package.

Beehive is in effect a history of the 1960s, with an emphasis on the female singers of the decade. Since events in history obviously cannot be isolated from each other, the show included several references to historical events of that time.

I was somewhat disappointed by the play, contending that a decade is too long to survey in one fell swoop. Too much happens during that period of time.

Later I started thinking about computing and time. And here in the last year of the 1980s, I wonder whether we really consider what an amazing achievement Tandy Corporation brought about with its introduction of the Color Computer almost a decade ago.

First of all, the CoCo is the only computer to stand the test of a decade. While it is arguable that CoCo 3 is a different machine from the CoCo 1 or 2, I do not believe they are essentially different. In fact, the earliest programs that ran on the original CoCo have no trouble whatsoever running on the CoCo 3.

This is quite different from saying, for instance, that there is an Apple computer today just as there was then. Similarly, there was a Commodore (Pet) then; there is a Commodore computer now. Any resemblance between the versions, other than the name, is purely imagination.

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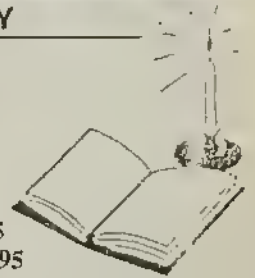


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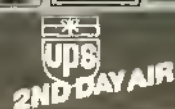
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Tandy brought computing into more homes and to more people than anyone ever has before.

Now I know that is a strong statement to make, but I think it is true even though I cannot prove it — as you know, Tandy is not in the habit of releasing sales figures.

I can say it because I know of several years when Tandy sold out "to the bare walls." If you consider the number of its domestic stores alone and figure what an average inventory must be, you come up with a startling amount of computers sold.

Add to that the fact that the CoCo has never been an expensive computer. Yes, if you "fully equip" a unit, you end up with a cost comparable to an MS-DOS machine. But consider, you do not have to fully equip it to make it run — and run well.

The rest of the computer world is talking about 80486 processors; Steve Jobs' "NExT" computer, which costs \$10,000; "diskless workstations" priced at *only* a couple thousand bucks; and good old OS-2, the "operating system of the future" (when *Presentation Manager* is finished, if ever). But every day, here at RAINBOW we

"... I wonder whether we really consider what an amazing achievement Tandy Corporation brought about with its introduction of the Color Computer almost a decade ago."

have people taking the CoCo to new heights and actually hundreds of people every month being added to our ranks.

Every once in a while, I receive letters from people asking me where they can buy *Lotus 1-2-3* or some other well-known MS-DOS program for their Color Computers. I reply that they cannot, but they can buy an excellent spreadsheet for the CoCo, any of a number of outstanding word processors and fine desktop publishing programs, and so on.

If you have the bucks, you can get an excellent hard-disk setup for your CoCo. But wait. It isn't *essential* to have a hard disk to run anything, really. In counterpoint to that, try running *WordPerfect 5.0* in your average Tandy PC or compatible on a pair of floppy disks.

I believe, as I told my friends the night I saw *Beehive*, that a decade is too long to sum up in a few hours. But I can sum up the CoCo in one sentence: Considering the technology available at the time of its design, the CoCo is something akin to a miracle.

— Lonnie Falk

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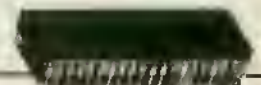
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How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with ORIGIN or EQUATE statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200, &H3F00: I=&H3FB0
20 PRINT "ADDRESS: "; HEX$(I);
30 INPUT "BYTE": B$
40 POKE I, VAL("0"&H"+B$)
50 I=I+1: GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7FB0.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, read.me.first, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9

programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

- 1) Type `load dir list` copy and press ENTER.
- 2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the system master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
- 3) List the read.me.first file to the screen by typing `list read.me.first` and pressing ENTER.
- 4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
- 5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/ filename /d0/cmds/ filename -s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/ filename /d0/cmds/ filename`

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal



The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

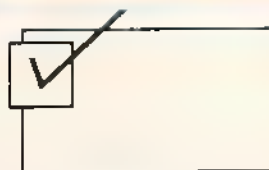
The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product per-

taining to CoCo. A Seal will be awarded to any commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use Rainbow Check PLUS, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since Rainbow Check PLUS counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS: X=256*PEEK(35)+178
20 CLEAR 25, X-1
30 X=256*PEEK(35)+178
40 FOR Z=X TO X+77
50 RERD Y: W=W+Y: PRINT Z, Y;
60 POKE Z, Y: NEXT
70 IF W=7985 THEN B0ELSE PRINT
  "DATA ERROR": STOP
80 EXEC X: END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```


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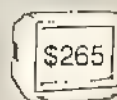
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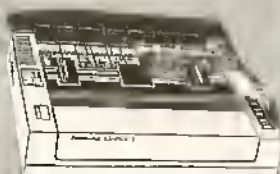
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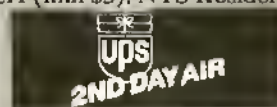


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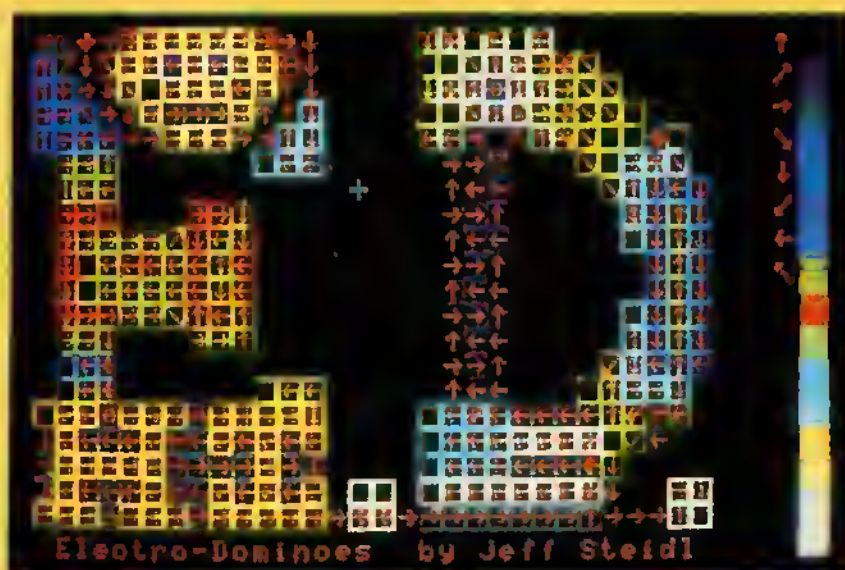




A new domino theory — put it on a CoCo and it will be faster, more fun and much more colorful

Electro Dominoes

By Jeff Steidl



Have you ever spent hours setting up dominoes, only to accidentally knock them down and have to start all over? Then, when you finally finish, you only get to watch them fall once. Maybe you don't have as many different colored dominoes as you would like, so watching them fall isn't too exciting.

Electro-Dominoes solves these problems and comes in the form of a very compact and powerful BASIC program. After running the program, there is a pause before the main workscreen appears. Here,

Jeff Steidl spends much of his time writing BASIC and assembly language programs as well as designing computer systems and languages. He has eight years of programming experience, ranging from MC-10 to VAX. Jeff's other interests include mathematics, music and electronics.

you can select an arrow or color with the joystick, placing the dominoes wherever you want. The color represents that on the sides of the dominoes, so when the domino falls, it turns that color. The arrow shows which direction the domino will fall — each domino can have up to two arrows in it. This allows as many as 16 paths of falling dominoes. To get rid of an arrow already on the screen, select the same direction arrow and delete it with the joystick.

After all of the dominoes are set up, you can knock them down. (Don't run out and get everyone to see it now, wait until you have debugged your setup.) Move the cursor over the domino you want to knock down and press H. Then enter a number (0 to 15) for the top color of the dominoes. The computer draws your dominoes as seen from above, and beeps. You can now press the up-arrow to start the reaction.

On the first run there is a good chance of having a bug in the works. Most often, it

involves a group of dominoes that don't fall. This is caused by forgetting an arrow or pointing one to the wrong place. Another problem is the *endless loop*. This is caused by a group of arrows in which the last points to the first. To get out of an endless loop, do exactly what you do in BASIC; press BREAK.

The last error is more subtle. When two arrows point to the same domino, the computer not only remembers the domino (and all the ones that it knocks down) falling once, but twice. This slows down the program some so, if you suspect it, double-check the workscreen. After watching the dominoes fall, press H or R to return to the workscreen.

If you break out of the program to do the impossible, end an endless loop, or just to do a directory, you can get back into the program by typing GOTO 1. The workscreen, as well as your domino setup is restored. To save a setup, press S and enter

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NOTE: Max-10 and CoCo Max Fonts aren't interchangeable
- **Spell Checker** 50000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24 **\$29.95**

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack or Colorware Hi-Res Pack; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or do graphics for a living, CoCo Max will amaze you. It's a promise.

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a filename; to load a setup, press L and enter the filename. To change dominoes in order to use a cassette system, change all occurrences of #W in lines 4, 10 and 11 to #V. (Make sure to have the auxiliary chord plugged in, and when saving, press the

Record and Play buttons on the recorder before you press ENTER.) The program runs at double speed, except during file manipulations. The palette colors may be altered by changing the first 16 DATA values in Line 23. Warning: Changing a BASIC line state-

ment erases your setup — save it first!

(Questions or comments concerning this article may be directed to the author at 605 Evergreen, Hohman, WI 54636. Please include an SASE when requesting a reply.)

Editor's Note: A sample file, DOMINO.SAM, is included on this month's RAINBOW ON DISK. To use the sample, press L after running DOMINO.S and follow the directions given in the article.

The Listing: DOMINOES

```

Ø CLEAR999:PCLEAR1:F=65497:POKEF
,O:Z=15:FOR Y=ØTOZ:READA:PALETTEY
,A:NEXT:CLS1:E=599:DIMA(Z),B(Z),
C(E),D(8),E(E),F(E),R(E),S(E),X(
E),Y(E):G=3Ø:FORP=ØTOE:X(P)=(P-I
NT(P/G)*G)*9:Y(P)=INT(P/G)*9:R(P
)=X(P)+8:S(P)=Y(P)+8:NEXT:FORN=1
TO8:READA$(N),D(N):NEXT
1 W=1:HBUFFW,39:T=65312:V=-1:U=2
52:H=74:I=2:J=7:L=3:Q=12:R=8:S=6
5496 ' COPYRIGHT 1989 FALSOFT,
INCORPORATED
2 POKEF,O:HCOLORR,O:HSCREEN2:FOR
A=ØTOJ:HDRAW"BM296","+STR$(A*Q)+A
$(A+W):NEXT:FORP=ØTOZ:HCOLORP:HL
INE(3Ø8,P*Q)-(319,P*Q+11),PSET,B
F:NEXT:IFK=ØTHENK=W:GOTO4
3 FORX=ØTOE:HCOLORC(X):HLINE(X(X
),Y(X))-(R(X),S(X)),PSET,B:A$="C
8BM"+STR$(X(X))+","+STR$(Y(X)):H
DRAWA$+A$(E(X)):HDRAWA$+A$(F(X))
:NEXT
4 CLOSE#W:POKEF,O:HLINE(R,184)-(
263,191),PSET,BF:HCOLORR:HPRIN
T(1,23),"Electro-Dominoes by Je
ff Steidl"
5 A=INT(JOYSTK(O)/I):B=JOYSTK(W)
/63:IFA<G THENM=O:B=INT(B*19):X=
A+B*G:A=A*9:B=B*9ELSEB=INT(B*Z)*
Q:IFA>G THENM=I:A=3Ø8ELSEA=296:M
=W:IFB>84THENB=84
6 HGET(A,B)-(A+J,B+J),W:HCOLORRN
D(Z):HDRAW"BM"+STR$(A)+","+STR$(
B)+"BD4BR1R6L3U3D6":A$=INKEY$:IF
A$="H"THEN15ELSEHPUT(A,B)-(A+J,B
+J),W:IFA$="S"THEN1ØELSEIFA$="L"
THEN11
7 IFBUTTON(O)THENIFM=2THENC=B/Q:
M1=O:GOTO9ELSEIFM THEND=B/Q+W:M1
=W:GOTO9ELSEIFM1=ØTHENHCOLORC:HL
INE(A,B)-(R(X),S(X)),PSET,B:C(X)
=C:GOTO5ELSEIFD=E(X)THENE(X)=F(X
):F(X)=ØELSEIFD=F(X)THENF(X)=ØEL
SEIFE(X)=ØTHENE(X)=D ELSEF(X)=D
ELSE5
8 HLINE(A+W,B+W)-(A+J,B+J),PRESE

```

```

T,BF:A$="C8BM"+STR$(A)+","+STR$(
B):HDRAWA$+A$(E(X)):HDRAWA$+A$(F
(X)):SOUND2ØØ,W
9 IFBUTTON(O)THEN9ELSE5
1Ø N$=" Save":GOSUB12:POKES,O:O
PEN"O",#W,N$:FOR Y=ØTO525STEP75:P
OKEF,O:A$="":FORX=Y TOY+H:A$=A$+
CHR$(E(X)+H)+CHR$(F(X)+H)+CHR$(C
(X)+H):NEXT:POKES,O:WRITE#W,A$:N
EXT:GOTO4
11 N$=" Load":GOSUB12:POKES,O:O
PEN"I",#W,N$:FOR Y=ØTO525STEP75:I
NPUT#W,A$:POKEF,O:N=W:FORX=Y TOY
+H:E(X)=ASC(MID$(A$,N,W))-H:F(X)
=ASC(MID$(A$,N+W,W))-H:C(X)=ASC(
MID$(A$,N+I,W))-H:N=N+L:NEXT:POK
ES,O:NEXT:GOTO2
12 HCOLORO:HLINE(R,184)-(263,191
),PSET,BF:HCOLORR:A=18:HPRINT(Q,
23),N$:N$=""
13 A$=INKEY$:IFA$=CHR$(13)THENRE
TURNELSEIFA$=CHR$(R)AND A>18THENH
COLORO:N$=LEFT$(N$,A-19):A=A+V:H
LINE(A*R,184)-(A*R+J,191),PSET,B
F:ELSEIFA<G AND A$>" "THENHCOLORR:
HPRINT(A,23),A$:N$=N$+A$:A=A+W
14 GOTO13
15 N$="Color":GOSUB12:HSCREEN1:
HCOLORVAL(N$):FOR Y=ØTOE:IFE(Y)OR
C(Y)THENHLINE(X(Y),Y(Y))-(R(Y),S
(Y)),PSET,B
16 NEXT:N=O:A(O)=X:SOUND2ØØ,W:PO
KET+L,63
17 IFINKEY$<>"^"THEN17
18 P=V:FORA=O TON:Y=A(A):HCOLORC
(Y):HLINE(X(Y),Y(Y))-(R(Y),S(Y))
,PSET,BF:IFE(Y)THENP=P+W:B(P)=Y+
D(E(Y)):IFF(Y)THENP=P+W:B(P)=Y+D
(F(Y))
19 NEXT:POKET,U:IFP=V THEN22
2Ø N=V:FORA=O TOP:Y=B(A):HCOLORC
(Y):HLINE(X(Y),Y(Y))-(R(Y),S(Y))
,PSET,BF:IFE(Y)THENN=N+W:A(N)=Y+
D(E(Y)):IFF(Y)THENN=N+W:A(N)=Y+D
(F(Y))
21 NEXT:POKET,O:IFN>V THEN18
22 A$=INKEY$:IFA$="H"THEN15ELSEI
FA$="R"THEN2ELSE22
23 DATA 1,7,9,1Ø,12,14,16,32,21,
28,31,52,54,58,63,BD7BR4U6NF2G2,
-3Ø,BD7BR1E6NL2D2,-29,BD4BR1R6NH
2G2,1,BR1BD1F6NU2L2,31,BR4BD1D6N
E2H2,3Ø,BR7BD1G6NU2R2,29,BR7BD4L
6NE2F2,-1,BR7BD7H6NR2D2,-31

```




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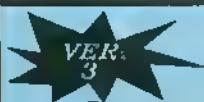
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See your CoCo 2 in a new way

A Tribute to the CoCo 2

By James A. Tatarka



For years, I have used my trusty CoCo 2 to write tests and create designs. My faithful computer has helped me to invent designs and pictures guaranteed to interest my students and amuse me. CoCo has followed me through my artistic efforts, patiently waiting until I got my creation just right.

Self Portrait is a tribute to my uncomplaining CoCo 2. Using 16K Extended Color BASIC, this program creates a miniature CoCo 2 on the computer screen. Once the portrait is complete, the miniature CoCo's screen displays its name. The portrait's screen is then erased, and the miniature CoCo exhibits its educational value by presenting a visual aid for a lesson on Einstein's theory of relativity. Once the lesson is over, CoCo's portrait entertains its captivated audience with a juggling act.

I expect to use my CoCo 2 for many years to come. Its graphic capabilities will help me to entertain my students and myself, and I hope that my salute to my CoCo 2 has amused you as well.

(Questions or comments regarding this program may be addressed to the author at 25 Manchester, Youngstown, OH 44509. Please enclose an SASE when requesting a reply.) ☐

James Tatarka has taught the sixth grade for 23 years and holds an MS in elementary education. He has had his CoCo 2 for five years and enjoys using it as a classroom aid.

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Pyramix

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Vocal Freedom

I've got to admit, this is one nifty computer program. *Vocal Freedom* turns your computer into a digital voice recorder. The optional *Hacker's Pac* lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shell" application for *Vocal Freedom* is an automatic message minder. Record a message for your family into memory. Set *Vocal Freedom* on automatic. When *Vocal Freedom* "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.

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Would your friends be impressed if your computer could read their minds? *Mental Freedom* uses the techniques of Biofeedback to control video game action on the screen. *Telekinesis*? Yes, you control the action with your thoughts and emotions. And, oh yes, it talks in a perfectly natural voice without using a

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BASIC Freedom

Do you ever type in BASIC programs, manually? If you do, you know it can be a real chore. *Basic Freedom* changes all that. It gives you a full screen editor just like a word processor, but for BASIC programs. Once loaded in, it is always on-line. It hides invisibly until you call it forth with a single keypress! This program is a must for programmers or anyone who types in programs. By Chris Babrook and a product of ColorVenture.

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This utility requires 512K. Reads your master disk once and then makes superfast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives.

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180 DRAW"BM48,145R155
190 DRAW"BM55,140R142
200 DRAW"BM45,140BR8BD5UEUEUBR11
ND5BR11ND5BR11ND5BR11ND5BR11ND5B
R11ND5BR11ND5BR11ND5BR11ND5BR11N
D5BR11ND5BR11ND5BR11DFDFD"
210 DRAW"BM54,145E2R141F2"
220 DRAW"BM48,145GDGDGBR13NU5BR1
1NU5BR11NU5BR11NU5BR11NU5BR11NU5
BR11NU5BR11NU5BR11NU5BR11NU5BR11
NU5BR12NU5BR12NU5BR13UUUUU"
230 DRAW"BM46,150E2R155F2"
240 DRAW"BM49,150GDGDGBR13NU5BR1
1NU5BR11NU5BR11NU5BR11NU5BR11NU5
BR11NU5BR11NU5BR11NU5BR11NU5BR11
NU5BR20NU5BR12BU5FDFDF"
250 DRAW"BM49,155E2R150F2"
260 DRAW"BM45,160U5BR20D5BR12U5B
R12D5BR12U5BR12D5BR12U5BR12D5BR1
2U5BR12D5BR12U5BR12D5"
270 '

```

```

280 POKE178,0:PAINT(60,40),,0:P
AINT(40,150),,0
290 DRAW"C0;BM0,111R35":DRAW"BM2
20,111R35"
300 POKE178,1:PAINT(0,0),,0
310 POKE178,254:PAINT(1,179),,0
320 DRAW"C1BM97,20U2H2L5G2D8F2R5
NE2BR9H2U8E2R5F2D8G2NL5BR11H2U8E
2R5F2D2BD6G2L5BR16H2U8E2R5F2D8G2
L5BR20NR9U3E2R3E2RU3H2L4GD"
330 DRAW"C1BM108,40H2L5G2D2F2R5F
2D3G2L5H2BD2BR17U13NR6BD6NR6BD7R
6BR10NU13R6BR10U13NR6BD6R6
340 DRAW"C1BM80,70U13R5F2D3G2L4B
D6BR13H2U9E2R4F2D9G2NL4BR10U13R5
F2D3G2LNL3FDFDFDBR10U13NL7R7BD13
BR5U13R5F2D3G2LNL3FDFDFDBR6U6NR6
EUEUEUEUFDFFDFDFDFD5"
350 DRAW"BR6NU13BR10U13NL6R6"
360 FORR=1TO3000:NEXT
370 IFD=5THENGOSUB550
380 IFD=3THENGOSUB570
390 IFD=7THENGOSUB610
400 PAINT(60,40),1,1
410 IFD=4THENGOSUB680
420 IFD=10THENGOSUB610
430 IFD=13THENGOSUB680
440 IFD=9THENGOSUB610
450 IFD=12THENGOSUB570
460 IFD=14THENGOSUB610
470 IFD=17THENGOSUB680
480 PAINT(60,60),1,1
490 IFD=4THENDRAW"C0BM55,55R144"
500 DRAW"C0BM55,85U70E2R140FD70G
2L140H2"
510 D=D+1:POKE178,D:PAINT(60,85)
,0
520 IFD=3THENGOSUB550ELSEIFD=5TH
EN GOSUB570ELSEIFD<255THEN400
530 IFD<255THEN400
540 GOTO50
550 FORR=2TO30:CIRCLE(120,47),R:
NEXT
560 RETURN
570 COLOR0:LINE(90,30)-(150,65),
PSET,BF
580 DRAW"C1BM95,60NR7U6NR7U6R7BR
3BD4R5BD3NL5BD5BR3U12F4DFDFEUEUE
4D12BR12L4H2UHU5E3R4FDFDFDBD4DG2BU
11BR7E2R2F2DGLGLGLD3R6"
590 FORR=1TO3000:NEXT
600 RETURN
610 FORR=1TO33
620 CIRCLE(90,60),R,1.555,.422,0
630 NEXT
640 FORR=1TO2500:NEXT0
650 PAINT(60,40),1,1
660 RETURN
670 PMODE4:RETURN
680 PMODE4:SCREEN1,1
690 RETURN

```


It's Word Processor Trade-in Time Again!

Send us ANY word processor and get VIP Writer III for \$49.95!

Include \$3 for shipping. Send \$52.95 and your old word processor to the address below. Offer expires 9/15/89 so Hurry!

VIP Writer III Ver. 2 *Cat. #90-908

VIP Writer III offers screen widths of 32, 40, 64 & 80 - all with 24 lines and actual lower case letters using the CoCo 3's hardware display. It runs at double clock speed and has 4-color menus making VIP Writer III FAST and EASY to use! You can choose foreground, background, hilite and cursor colors from up to 64 hues. Color can be turned ON or OFF for the best possible display using a monochrome monitor or TV set. VIP Writer III has a context sensitive help facility to display command usage in easy to read colored windows.

CUSTOMIZER & PRINTER INSTALLER

VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set interface type (serial, parallel or J&M), baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

MORE TOTAL TEXT STORAGE

VIP Writer III has 106K total text storage in a 128K CoCo 3 (495K in 512K). VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII files. You can use VIP Writer III to even type BASIC programs! There is a 48K text buffer (438K in a 512K CoCo 3) and disk file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems Hard Disk.

POWERFUL EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typematic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

Writer III or Library /W owners: Upgrade to the VIP Writer III 2.0 for \$10 + \$3 S/H. Send ORIGINAL disk and \$13 total.

Rated "BEST" in RAINBOW Sept. 1988

AUTOMATIC TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE!

PREVIEW PRINT FORMAT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, broken paragraphs, orphan lines etc.

PRINTING VERSATILITY

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most serial or parallel printers using J&M JFD-CP or Rainbow interface and gives you the ability to select baud rates from 110 to 19,200. You can embed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

BUILT IN PRINT SPOOLING

VIP Writer III has a print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job! Some word processors DO NOT include this feature!

50,000 WORD SPELLING CHECKER

VIP Writer III includes VIP Speller (not FREEWARE) to check your text for misspelled words! It has a 50,000 (not 20,000) word dictionary that can be added to or edited.

QUALITY DOCUMENTATION

VIP Writer III comes with a well written 125 page manual which is Laser printed, not dot-matrix like the competition. It includes a tutorial, glossary of terms and examples for the beginner as well as a complete index! VIP Writer III is truly the BEST you can buy.

VIP Writer III includes VIP Speller 1.1.

DISK \$79.95

VIP Writer owners: Upgrade to the Writer III 2.0 for \$49.95 + \$3 S/H. Send original disk and \$52.95 total.

VIP Database III *Cat. #90-915

VIP Database III features selectable screen displays of 40, 64 or 80 characters by 24 lines with choice of 64 foreground, background, hilite and cursor colors for EASY DATA ENTRY. It uses the CoCo 3's hardware screen and double clock speed to be the FASTEST database available! VIP Database III will handle as many records as will fit on your disks and is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. IN-MEMORY SORT of records is LIGHTNING FAST and provides for easy listing of names, figures, addresses, etc., in ascending or descending alphabetical or numeric order. Records can be searched for specific entries using multiple search criteria. The built-in mail-merge lets you sort and print mailing lists, print form letters, address envelopes - the list is endless. The built-in MATH PACKAGE even performs arithmetic operations and updates other fields. VIP Database III also has a print spooler and report generator which uses print forms you create. DISK \$69.95

VIP Database owners: Upgrade to the VIP Database III for \$39.95 + \$3 S/H. Send ORIGINAL disk and \$42.95 total.

VIP Library /WDCE \$179.95

The VIP Library /WDCE (Writer Database Calc Enhanced) combines all six popular VIP application programs - VIP Writer III, Database III, Calc III, Speller, Terminal and Disk-ZAP - into one program on one disk called VIP Desktop. For VIP Library shipping please add \$4 USA, \$5 Canada, \$10 Foreign.

VIP Library owners: Upgrade to the VIP Library /WDCE for \$99.95 + \$3 S/H. Send ORIGINAL disk and \$102.95 total.

VIP Library /WDE owners: Upgrade to the VIP Library /WDCE for \$10 + \$3 S/H. Send ORIGINAL disk and \$13 total.

SD Enterprises info line (805) 566-1317

P O Box 621 Carpinteria, Ca. 93013

Non VIP Library orders add \$3 for shipping and handling in USA, Canada \$4, Foreign \$6. COD orders add an additional \$2.75. Checks allow 3 weeks for delivery. California residents add 6% sales tax.

* Available through your nearby Radio Shack Computer Center® and participating Radio Shack stores and dealers or order direct from Express OrderSM by dialing 1-800-321-3133.

VIP Calc III *Cat. #90-916

FAST 4-color POPUP menus • PRINT SPOOLER
32, 40, 64 and 80 Column HARDWARE display!

Runs VERY VERY FAST at double clock speed!

Now every CoCo 3 owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some. VIP Calc III allows a large worksheet with up to 512 columns by 1024 rows! In addition, VIP Calc III has up to 16 windows which allow you to compare and contrast results of changes. Other features include 8 AND 16 digit precision • trig. functions • averaging • algebraic functions • column and row ascending and descending SORTS • locate formulas or titles in cells • block move and replicate • global or local column width • limitless programmable functions • create BAR charts. Embed printer control codes for customized printing. Combine spreadsheet data with VIP Writer documents to create ledgers, projections, statistical & financial budgets and reports. DISK \$69.95

VIP Calc owners: Upgrade to the VIP Calc III for \$29.95 + \$3 S/H. Send original disk and \$32.95 total.

Buy RGB-DOS for \$29.95,

Get Hard Disk support, new commands and a Disk Drive FREE!*

Sounds too good to be true? If you own a Radio Shack FD 502 or other double sided Disk Drive, using RGB-DOS, you can access the other side of your Disk Drive giving a second disk drive absolutely free! RGB-DOS also supports up to 2 Hard Drives that can be used by DISK BASIC as well as OS-9. RGB-DOS works with CoCo 1, 2 and 3 and supports double sided drives and faster stepping rates. Other features include: Full screen directory display shows drive #, free space and even a disk name! • RUNM command and FLEXIKEY Last Command Recall and Edit system • EPROM version executes any program when CoCo is turned on for hands free start-up. 64K Req'd.

SD Enterprises credit card / COD order line.

1-800-322-9873 EXT 3



1st Prize

Pandas

Howard C. Runse

Last year pandas on loan from China were displayed at Busch Gardens. Howard captured the moment with *CoCo Max III*.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will forward two first prizes of \$25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of \$15 and one third prize of \$10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

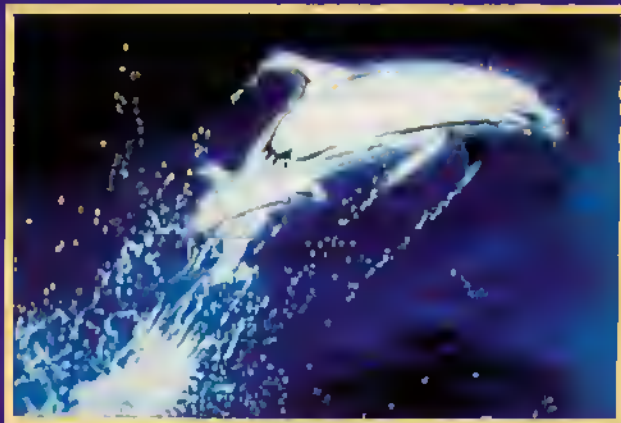
—Tony Olive, Curator

2nd Prize

Dolphin

Marc Vaillancourt

A secondary student living in Ste-Foy, Quebec, Marc enjoys visiting the many BBSs in his area. The scene is designed with *Color Max III*.





3rd Prize

My Room

Yvan Langlois

This view of Yvan's workstation was created from a BASIC program, which he wrote. From Laval, Quebec, Yvan likes to learn about hardware and OS-9 projects for his CoCo 1 and 2.



1st Prize, Coco 1 or 2

English Beat

George Kowalski

An electrical engineering student at Marquette University, George found some spare time to generate this image using *Graphicom*. He resides in Milwaukee, Wisconsin.

Honorable Mention

Ad Infinitum

Keith Schuler

A depiction of the shadowy realm between reality and fantasy. Of Merritt Island, Florida, Keith designed this BASIC program. His hobbies are swimming, drawing, model car racing and reading.





*The answer lies not in the cards,
but on the screen*

The CoCo Crystal Ball

By Paul D. Burnham

Many of us have an interest in or, at least, a fascination with astrology, the zodiac, fortune telling, etc. So why not bring these ancient arts and sciences to modern times with the use of your CoCo?

Paul D. Burnham is Computer Operations manager for Miami County, Ohio. He is also a magician and a member of the Society of American Magicians. His other interests include computer programming, art, audio-video, music and sports.

You can with *The Fortune Teller*. Whether you have just a slight interest in your daily horoscope, or you are really into astrology and fortune telling, you'll get a kick out of this program.

Don't worry if you do not have a disk drive — all the information is contained in the program itself. I designed it that way, so all you need is a CoCo with a minimum of 64K, and you're ready to roll.

After running the program and the appearance of the title screen, *The Fortune Teller* asks you a few questions such as the

day's date, your birthdate, your name, etc. Answer these questions and you're off and running.

The Fortune Teller describes your good points, bad points, type of career and mates best suited for you, lucky days, best colors and good fortune numbers. It uses information based on your zodiac sign and even more detailed information based on the list of deacons and your ruling planets.

After reading all of this information, the program asks if you have any questions. Yes, the *Fortune Teller* can answer yes or



Telewriter-128™

the Color Computer 3 Word Processor

TELEWRITER: UNDISPUTED #1

If you've read the other word processor ads, you've probably had your fill of cold lists of features, and claims of ultimate speed, power, and ease of use. So let's try to get past the overblown claims and empty buzz words—with 2 simple facts:

Fact 1: Telewriter is undisputedly the #1 most popular word processor on the Tandy Color Computers.

Fact 2: Telewriter's exemplary ease of use and power have been acclaimed in numerous magazine reviews and in thousands of letters and calls from end users.

THE OTHERS DON'T UNDERSTAND

So why has Telewriter gained such a large and loyal following, while other Color Computer word processors have come and gone? Ironically, our competitors' ads tell you *exactly* why.

For them, word processing is nothing more than features and numbers. The longer the list of features, and the bigger the numbers, the better the word processor. Or so they think.

They just don't understand that power and ease of use are not gained by tacking on random features or throwing in freebie utilities or forcing you to use a cumbersome mouse.

Real Power, true Ease of Use, and genuine Speed can only be attained through thoughtful, logical, intelligent design, attention to detail, and a commitment to the act and the art of writing. That's the Telewriter tradition, and that's the reason for Telewriter's phenomenal success.

TELEWRITER-128: INTELLIGENT DESIGN PERFECTED

And now, Telewriter-128, the latest Telewriter, uses the added hardware power of the Color Computer 3 to bring this intelligent design to its logical perfection.

Telewriter-128 adds unsurpassed speed and important new features to the already impressive arsenal of Telewriter-64. Not just speed for speed's sake, or features for the sake of advertising—but speed where it counts and features that make you a more efficient, more effective writer.

Rainbow magazine put it this way: "Telewriter-128 will set the word processing standard for the Color Computer 3 because it is so simple and user friendly. . . . The 81-page tutorial/user's manual is nicely done. It is written in easy to understand language but the program itself is so easy. . . . Most people will be able to use the software right out of the package."

TELEWRITER-128 OR DESKTOP PUBLISHING

Desktop publishing is nice for adding pictures and fancy fonts to newsletters or business presentations—but its graphics orientation sacrifices some important capabilities when it comes to working with words.

If your main concern is expressing ideas through words (notes, letters, reports, papers, novels, etc.), the dedicated word processing power of Telewriter-128 still provides the most efficient tool for the job. Each tool has its place—desktop publishing for striking visuals, Telewriter-128, for effective writing.

TELEWRITER-128 OR TELEWRITER-64

You can no longer afford to be without the ease, power, and efficiency, that Telewriter brings to everything you write.

FEATURES THAT MATTER: Telewriter's outstanding design and its complete set of features, put it in a class by itself, for smooth, efficient writing and letter perfect printed documents. Telewriter-128 includes:

Unbeatable **SCREEN PERFORMANCE:** lightning fast paging and scrolling, on-screen text that never lags behind your typing, and a response that is always instantaneous, no matter how much text is in the buffer, or where you are in the document.

26 User definable **MACRO KEYS** type your often used phrases and titles with a single keypress—saving you time and freeing your concentration for writing. User settable **DUAL SPEED CURSOR** moves you anywhere on the line, on the page, or in the document, fast or slow—you decide, with the touch of a finger. Fast **PRINT PREVIEW MODE** shows you text as it will print: headers, footers, margins, page breaks, page numbers, justification—saves time and paper and guarantees perfect looking documents everytime.

Instant, **ON-LINE HELP** summarizes all Telewriter-128 commands and special symbols. The On-line **OPTIONS MENU** lets you instantly customize the writing environment at any time to suit your precise needs (Screen/character color, Monochrome on/off, Key repeat/delay rate, 2 Cursor repeat/delay rates, Case-sensitivity of search, Auto file backup on/off, and more). A **SINGLE FUNCTION KEY** takes you instantly to any menu, so you never have to stop and think.

The 24, 25 or 28 **LINE SCREEN DISPLAY** option lets you see 16% more on-screen text (28), or wider line spacing (25). The auto-loading **OPTIONS FILE** stores all your Macros, Print Format settings, and Options Menu settings, so they are always there everytime you run Telewriter-128. 3 pop-up **STATUS WINDOWS** tell you cursor position, word count,

Telewriter-128 for the Color Computer 3 costs \$79.95 on disk, \$69.95 on cassette.

For the Color Computer 1&2, Telewriter-64 costs \$59.95 on disk, \$49.95 on cassette.

To order by MasterCard or Visa, call (619) 755-1258 anytime, or send check to:

COGNITEC

704 Nob Avenue
Del Mar, CA 92014

(Add \$2 S&H. Californians add 6% tax. To upgrade from TW-64 to TW-128 send original TW-64 disk and \$41.95.)

Telewriter is also available through your nearby Radio Shack Computer Center and participating Radio Shack stores and dealers—or order direct from Express Order by dialing 1-800-321-3133.

Ask for: Telewriter-128 (disk) . . . cal #90-0909
Telewriter-64 (disk) . . . cal #90-0254
Telewriter-64 (cass) . . . cal #90-0253

free space, etc.

The **QUICK SAVE** feature lets you instantly save your current document with just 2 keystrokes and without leaving the editor. **CURSOR THROUGH DIRECTORY** to Load, Append, Rename and Kill files—so you'll never type a filename after the first time. **HANGING INDENTS** help you organize ideas on the page more effectively. Also: Footers, Multiple Print, Print to Disk, Key Click, Key Repeat, 40/80 Column Option, Overstrike, Word Delete, Nested Macros, Definable Foreign and Math Symbols and more. . . .

And, of course, Telewriter-128 incorporates all the features of TELEWRITER-64, like: Works with *absolutely any printer* that works with your Color Computer (1, 2, or 3). Uses simple Embedded Control Codes so *all* intelligent features of your printer are easily accessed, including: Underlining, Boldface, variable Fonts, Sub-script, Super-script, Italics etc.

Format commands allow dynamically changing Margins, Headers, Spacing, Centering, etc., anywhere in the document. Format menu sets Margins, Spacing, Page numbering, Baud rate, Lines per page, Justification. Chain Printing means the size of your printed document is unlimited. Also Single page and Partial Print.

Fast full-screen editor with wordwrap, text alignment, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, settable tabs, word and line counter, full error protection. Insert or delete anywhere on screen. Simple, easy to remember, "mnemonic" Editor Commands. Load, Save, Append, Partial Save files to disk or cassette, Kill, rename and list disk files. ASCII file compatibility.

no questions, and they are not random yes or no answers. Better yet, it uses the Pyramid Method, used for years by many fortune tellers. As with most of their answers, the meanings are not obvious at first. In-

stead, you have to find the hidden meaning in each answer, which adds to the mystery and fun of the program.

Give the *Fortune Teller* a try, maybe to spice up your next party.

(Questions or comments concerning this program may be directed to the author at 648 West Greene St., Piqua, OH 45356. Please include an SASE when requesting a reply.)

✓ 120	.....238	4001	.....64	4504	.....81
260	.....38	4006	.....56	4509	.....194
400	.....182	4013	.....172	4514	.....167
410	.....95	4021	.....38	4518	.....196
760	.....138	4027	.....112	4523	.....103
970	.....4	4036	.....246	4528	.....12
3006	.....140	4042	.....83	4533	.....117
3501	.....128	4051	.....197	5000	.....23
3506	.....189	4057	.....237	END	.....45

The Listing: FORTUNE

```

Ø 'COPYRIGHT 1989 FALOSFT, INC
1 '*****
2 '*'
3 '*' FORTUNE TELLER '*'
4 '*' COPYRIGHT (C) 1989 '*'
5 '*' BY '*'
6 '*' PAUL D. BURNHAM '*'
7 '*'
8 '*****
9 DIMWS$(15)
1Ø CLS:PRINT" *****
*****"
2Ø PRINT" *
*"
3Ø PRINT" * FORTUNE TELLER
*"
4Ø PRINT" * COPYRIGHT (C) 198
9 *"
5Ø PRINT" * BY
*"
6Ø PRINT" * PAUL D. BURNHAM
*"
7Ø PRINT" *
*"
8Ø PRINT" *****
*****"
9Ø FORD=1TO2ØØØ:NEXTD
1ØØ '*** INFORMATION ROUTINE
11Ø CLS:PRINT"PLEASE ENTER REQUE
STED INFORMATION..."
12Ø PRINT:PRINT"TODAY'S DATE (MM
/DD/YY)?"
125 LINEINPUTDA$
126 IFLEN(DA$)<>8THENPRINT"INCOR
RECT FORMAT...TRY AGAIN.":GOTO12
Ø
13Ø PRINT:PRINT"YOUR BIRTHDATE (
MM/DD/YY)?"
135 LINEINPUTDT$
136 IFLEN(DT$)<>8THENPRINT"INCOR
RECT FORMAT...TRY AGAIN.":GOTO13
Ø
14Ø PRINT:PRINT"YOUR NAME?"

```

```

145 LINEINPUTNA$
16Ø CLS:PRINT:PRINT:PRINT:PRINT"
ONE MOMENT..."
17Ø PRINT@452,"...YOUR FORTUNE'S
COMING UP."
2ØØ '*** AGE ROUTINE
21Ø TM$=MID$(DA$,1,2):TD$=MID$(D
A$,4,2):TY$=MID$(DA$,7,2)
22Ø BM$=MID$(DT$,1,2):BD$=MID$(D
T$,4,2):BY$=MID$(DT$,7,2)
23Ø TM=VAL(TM$):TD=VAL(TD$):TY=V
AL(TY$)
24Ø BM=VAL(BM$):BD=VAL(BD$):BY=V
AL(BY$)
25Ø IF TM>BM THEN 3ØØ
26Ø IF TM=BM THEN 28Ø
27Ø TY=TY-1:GOTO3ØØ
28Ø IF TD>=BD THEN 3ØØ
29Ø TY=TY-1
3ØØ YO=TY-BY
35Ø '*** ZODIAC ROUTINE
351 IFBM=3ANDBD>=21ORBM=4ANDBD<=
2ØTHENZO=1:GOTO4ØØ
352 IFBM=4ANDBD>=21ORBM=5ANDBD<=
2ØTHENZO=2:GOTO4ØØ
353 IFBM=5ANDBD>=21ORBM=6ANDBD<=
21THENZO=3:GOTO4ØØ
354 IFBM=6ANDBD>=22ORBM=7ANDBD<=
21THENZO=4:GOTO4ØØ
355 IFBM=7ANDBD>=22ORBM=8ANDBD<=
22THENZO=5:GOTO4ØØ
356 IFBM=8ANDBD>=23ORBM=9ANDBD<=
22THENZO=6:GOTO4ØØ
357 IFBM=9ANDBD>=23ORBM=1ØANDBD<
=22THENZO=7:GOTO4ØØ
358 IFBM=1ØANDBD>=23ORBM=11ANDBD
<=23THENZO=8:GOTO4ØØ
359 IFBM=11ANDBD>=24ORBM=12ANDBD
<=21THENZO=9:GOTO4ØØ
36Ø IFBM=12ANDBD>=22ORBM=1ANDBD<
=19THENZO=1Ø:GOTO4ØØ
361 IFBM=1ANDBD>=2ØORBM=2ANDBD<=
19THENZO=11:GOTO4ØØ
362 IFBM=2ANDBD>=2ØORBM=3ANDBD<=
2ØTHENZO=12:GOTO4ØØ
4ØØ '*** DECAN ROUTINE
4Ø1 IFZO=1THENIFBD>=21ANDBD<=29T
HENDE=1ELSEIFBD>=11ANDBD<=2ØTHEN
DE=3ELSEDE=2
4Ø2 IFZO=2THENIFBD>=21ANDBD<=29T
HENDE=1ELSEIFBD>=11ANDBD<=2ØTHEN
DE=3ELSEDE=2
4Ø3 IFZO=3THENIFBD>=21ANDBD<=3ØT
HENDE=1ELSEIFBD>=11ANDBD<=21THEN
DE=3ELSEDE=2
4Ø4 IFZO=4THENIFBD>=2ANDBD<=1ØTH
ENDE=2ELSEIFBD>=11ANDBD<=21THEND

```


NEW

BEST PUBLIC DOMAIN PROGRAMS !

FROM T&D SUBSCRIPTION SOFTWARE

NEW

T&D SUBSCRIPTION SOFTWARE HAS ACCUMULATED OVER 1,000 PUBLIC DOMAIN PROGRAMS FOR THE COLOR COMPUTER.

WE ARE SELLING 630 OF THE BEST. JUST THE GOOD STUFF !

Music 1-7

- M1 - 8 Utilities & 8 Songs
- M2 - 17 Musica Files
- M3 - 16 Musica Files
- M4 - 16 Musica Files
- M5 - 25 Orchestra Files
- M6 - 23 .Bin Files Ready To Run
- M7 - 23 .Bin Files Ready To Run

ADVENTURES 1,2

Each Disk/Tape Contains
9 Great Adventures
Ready To Run

Order A1 Or A2

TELECOMMUNICATIONS 1-3

- T1 - Haysae, Kemit, Mterm
- T2 - Cobster Terminal Package
- T3 - Mikeytor Terminal Package

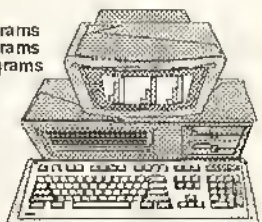


EDUCATION 1-4

- E1 - 12 Programs For Young Kids
- E2 - 12 Programs For High School Kids
- E3 - 11 Programs Teaching The Coco'S Commands
- E4 - 5 Graphics Programs About Australia

GRAPHICS 1-4

- G1 - 12 Basic Graphic Programs
- G2 - 12 Basic Graphic Programs
- G3 - 9 Coco 3 Graphic Programs
- G4 - 22 Coco Max Pictures
- G5 - 22 Coco Max Pictures
- G6 - 22 Coco Max Pictures
- G7 - 15 Coco Max Pictures
- G8 - 22 .Bin Pictures
- G9 - 22 .Bin Pictures
- G10 - 14 Large .Bin Pictures
- G11 - 8 Mge Pictures
- G12 - Coco Max 3 Pictures
- G13 - Macpaint Graphic Editor
- G14 - 5 Macintosh Pictures



HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

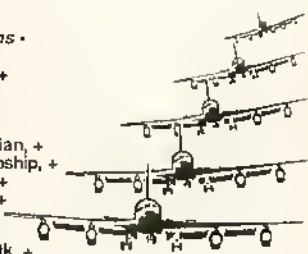
- H1 - Checkbook, Database, Word Processor, +
- H2 - Cash Journal, Investments, Mail List, +
- H3 - Finance, Int. Rates, Stocks, +
- H4 - Spelling Fix, Spelling Checker, +



GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

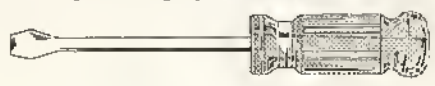
- GA1 - 3Dlidae, Missie, Poker, Tycoon, +
- GA2 - Chess, Motojump, Rider, Slots, +
- GA3 - Battship, Golf, Lander, Robots, +
- GA4 - Abm, Cartel, Subchase, Trak, +
- GA5 - Blackjack, Laser, Raceway, Utopian, +
- GA6 - Kings, Navyguns, Poolgame, Subship, +
- GA7 - Connect4, F-16, Life, Mazeland, +
- GA8 - Chute, Football, Othello, Silifer, +
- GA9 - Civilwar, Flight, Prix, Stock, +
- GA10 - Cave, Fly, Pedro, Scramble, +
- GA11 - Bunkers, Craps, Gunner, Nukeattk, +



UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

- U1 - Backup35, Diskzap, Romcopy, Timer, +
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T3	G13			
	G14			

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```

E=3ELSEDE=1
405 IFZO=5THENIFBD>=2ANDBD<=12TH
ENDE=2ELSEIFBD>=13ANDBD<=22THEND
E=3ELSEDE=1
406 IFZO=6THENIFBD>=2ANDBD<=11TH
ENDE=2ELSEIFBD>=12ANDBD<=22THEND
E=3ELSEDE=1
407 IFZO=7THENIFBD>=2ANDBD<=12TH
ENDE=2ELSEIFBD>=13ANDBD<=22THEND
E=3ELSEDE=1
408 IFZO=8THENIFBD>=3ANDBD<=14TH
ENDE=2ELSEIFBD>=15ANDBD<=23THEND
E=3ELSEDE=1
409 IFZO=9THENIFBD>=24ANDBD<=30T
HENDE=1ELSEIFBD>=1ANDBD<=11THEND
E=2ELSEDE=3
410 IFZO=10THENIFBD>=22ANDBD<=30
THENDE=1ELSEIFBD>=11ANDBD<=19TH
ENDE=3ELSEDE=2
411 IFZO=11THENIFBD>=20ANDBD<=31
THENDE=1ELSEIFBD>=1ANDBD<=10TH
ENDE=2ELSEDE=3
412 IFZO=12THENIFBD>=2ANDBD<=10T
HENDE=2ELSEIFBD>=11ANDBD<=20TH
ENDE=3ELSEDE=1
600 '*** PRINT ROUTINE
610 CLS:PRINT"F O R T U N E"
620 PRINT:PRINT"THIS FORTUNE IS
FOR          ";NA$;"."
630 PRINT"YOU ARE ";YO;" YEARS O
LD."
640 PRINT"YOUR BIRTHDATE IS ";DT
$;"."
650 GOSUB4000
660 GOSUB4500
700 '*** QUESTION ROUTINE
705 CLS
710 INPUT"DO YOU HAVE A QUESTION
FOR THE FORTUNE TELLER";YN$
720 IFYN$="N"ORYN$="NO"THEN5000
730 CLS:PRINT"PLEASE ASK A YES O
R NO QUESTION THAT IS LESS THAN
TEN WORDS IN LENGTH. AT THE EN
D OF THE QUESTION, PRESS sp
ace bar ONCE AND THEN PRESS ent
er.""
740 PRINT
750 C=0:P=0:P1=0
760 INPUTQS$
770 C=C+1:P1=P+1
771 QL=LEN(QS$)
772 IFMID$(QS$,QL,1)<>" "THENPRI
NT"YOU FORGOT THE SPACE AT THE E
ND OF THE QUESTION...ASK AGAIN."
:GOTO750
773 P=INSTR(P1,QS$," ")
775 W$(C)=MID$(QS$,P1,P-P1)
780 IF P=QL THEN 810
790 GOTO770
810 IFC<3THENPRINT"QUESTION TOO
SHORT...TRY AGAIN.":GOTO750

```

```

820 IFC>9THENPRINT"QUESTION TOO
LONG... TRY AGAIN.":GOTO750
825 PRINT
830 FORI=1TOC
840 L=LEN(W$(I))
850 FORJ=1TOL
860 QS=MID$(W$(I),J,1)
870 GOSUB3000
880 W(I)=W(I)+Q
890 NEXTJ
900 IFW(I)<10THEN940
910 X=W(I)
920 GOSUB1500
930 W(I)=X
940 NEXTI
950 '*** PYRAMID ROUTINE
960 C=C-1
970 FORI=1TOC
980 T(I)=W(I)+W(I+1)
990 IFT(I)<10THEN1030
1000 X=T(I)
1010 GOSUB1500
1020 T(I)=X
1030 NEXTI
1040 FORI=1TOC
1050 W(I)=T(I)
1060 NEXTI
1070 IFC>1THEN960
1080 GOTO3500
1500 '*** REDUCING ROUTINE
1510 X$=STR$(X)
1520 L1=LEN(X$)
1530 Y=0
1540 FORK=1TOL1
1550 Y$=MID$(X$,K,1)
1560 Y1=VAL(Y$)
1570 Y=Y+Y1
1580 NEXTK
1590 X=Y
1600 IFX<10THEN1620
1610 GOTO1510
1620 RETURN
3000 '*** PYRAMID DATA
3001 IFQ$="A"THENQ=1
3002 IFQ$="B"THENQ=5
3003 IFQ$="C"THENQ=6
3004 IFQ$="D"THENQ=4
3005 IFQ$="E"THENQ=2
3006 IFQ$="F"THENQ=8
3007 IFQ$="G"THENQ=8
3008 IFQ$="H"THENQ=3
3009 IFQ$="I"THENQ=7
3010 IFQ$="J"THENQ=6
3011 IFQ$="K"THENQ=6
3012 IFQ$="L"THENQ=5
3013 IFQ$="M"THENQ=7
3014 IFQ$="N"THENQ=5
3015 IFQ$="O"THENQ=8
3016 IFQ$="P"THENQ=5
3017 IFQ$="Q"THENQ=6
3018 IFQ$="R"THENQ=9

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20 Meg High Speed Kit Complete	799.00
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Assemble Int & Test any of the above	60.00
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3019 IFQ$="S"THENQ=9
3020 IFQ$="T"THENQ=2
3021 IFQ$="U"THENQ=8
3022 IFQ$="V"THENQ=8
3023 IFQ$="W"THENQ=3
3024 IFQ$="X"THENQ=1
3025 IFQ$="Y"THENQ=8
3026 IFQ$="Z"THENQ=6
3030 RETURN
3500 '*** PYRAMID ANSWERS
3501 IFW(1)=1THENPRINT"BE ASSURE
D THAT IN TIME SUCCESS WILL BE Y
OURS AND YOUR HOPES WILL PROS
PER, IF NOT THROUGH YOUR OWN
DOING THEN AS THE RESULT OF
SOME UNEXPECTED HAPPENING
S."
3502 IFW(1)=2THENPRINT"THE WIL
L BE NO SUCCESS IF HESITATIO
N HAS REPLACED DETERMINA
TION. THE OPPOSITE SEX WILL HAVE
A POWERFUL INFLUENCE IN BRINGI
NG A NEGATIVE RESULT."
3503 IFW(1)=3THENPRINT"YOU MAY E
XPECT GAINS, ADVANCEME
NT OR A BROADENING OF ACTIVITIE
S, BUT YOU MUST HOLD FAST TO Y
OUR PURPOSE AND NEVER LET YOURS
ELF BE SWAYED IN DOING WHAT YOU
DESIRE TO DO."
3504 IFW(1)=4THENPRINT"YOU WILL
EXPECT FAR MORE THAN YOU WILL
RECEIVE, FOR DISAGREEM
ENT AND QUARRELING WILL RUIN YOUR
PLANS. THIS WILL HAPPEN BE
CAUSE OTHERS WISH TO TAKE ADVA
NTAGE OF YOU."
3505 IFW(1)=5THENPRINT"THE WIL
L BE NO SUCCESS IF HESITATIO
N HAS REPLACED DETERMINA
TION. THE OPPOSITE SEX WILL HAVE
A POWERFUL INFLUENCE IN BRINGI
NG A NEGATIVE RESULT."
3506 IFW(1)=6THENPRINT"YOU MAY E
XPECT ASSISTANCE FROM SOMEONE O
F THE OPPOSITE SEX. WHAT YOU
DESIRE IS GOING TO BE FULFILLED
, AND IN THE END THE STEPS YOU
HAVE ALREADY TAKEN WILL NOT
BE REGRETTED."
3507 IFW(1)=7THENPRINT"YOU MAY A
NTICIPATE POSITIVE RESULTS T
HAT WILL INVOLVE YOU IN RELATIONS
WITH MANY PEOPLE. IF YOU ARE N
OT INFLUENCED BY THE ADVICE OF
ANOTHER, YOU WILL REAP JOY."
3508 IFW(1)=8THENPRINT"THE WIL
L BE NO SUCCESS IF HESITATIO
N HAS REPLACED DETERMINA
TION. THE OPPOSITE SEX WILL HAVE
A POWERFUL INFLUENCE IN BRINGI
NG A NEGATIVE RESULT."

```

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O TO THE ILL WILL AND MALICE OR
INCOMPETENCY OF OTHERS."
3509 IFW(1)=9THENPRINT"THE WIL
L BE NO SUCCESS IF HESITATIO
N HAS REPLACED DETERMINA
TION. THE OPPOSITE SEX WILL HAVE
A POWERFUL INFLUENCE IN BRINGI
NG A NEGATIVE RESULT."
SO HAVE COURAGE."
3510 PRINT:PRINT:GOTO 710
4000 '*** ZODIAC ANSWERS
4001 IFZO=1THENPRINT"YOU WERE BO
RN UNDER THE SIGN OF ARIES - THE
RAM. YOU ARE A LEADER - CH
OOSE A CAREER WHERE YOU CAN SHI
NE BY YOURSELF.":PRINT:LINEINPUT
"PRESS enter TO CONTINUE...";YN
$
4002 IFZO=1THENCLS:PRINT"YOU WIL
L BE ADMIRER FOR YOUR SUCCESS
THRU EXTRAORDINARY ACHEIVE
MENTS. LEARN NOT TO TAKE ON TOO
MUCH AT ONCE - YOU WORK TOO HAR
D - RELAX. YOU WILL FALL IN LOVE
MANY TIMES THINKING EACH"
4003 IFZO=1THENPRINT"IS THE LOVE
OF YOUR LIFE - SO MARRY ONLY
AFTER LONG ENGAGEMENT- NEVER ELO
PE. YOU ARE POPULAR AND MAKE FR
IENDS EASILY - TO AVOID SORRO
W FOR YOURSELF - CONTROL YOU
R TEMPER AND TENDENCY TO BOSS PEO
PLE."
4004 IFZO=1THENPRINT:LINEINPUT"P
RESS enter TO CONTINUE...";YN$
4005 IFZO=2THENPRINT"YOU WERE BO
RN UNDER THE SIGN OF TAURUS - TH
E BULL. YOU WILL BE HAPPIEST DO
ING SOME SORT OF CREATIVE WO
RK.":PRINT:LINEINPUT"PRESS enter
TO CONTINUE...";YN$
4006 IFZO=2THENCLS:PRINT"YOU WIL
L BE SUCCESSFUL IN YOUR CHOSEN
CAREER. YOU MAKE CLOSE FRIEND
SHIPS EASILY - AND WILL ENJOY
MANY OF THEM. OBSTANANCE IS YOU
R WORST FAULT - YOU REFUSE TO ACC
EPT CHANGE, THINKING OLD"
4007 IFZO=2THENPRINT"WAY OF DOIN
G IS BETTER WAY OF DOING. YOU
WILL ENJOY VERY GOOD HEALTH - DO
NOT OVEREAT OR DRINK AND GET PLE
NTY OF EXERCISE.":PRINT:LINEINPU
T"PRESS enter TO CONTINUE...";YN
$
4010 IFZO=3THENPRINT"YOU WERE BO
RN UNDER THE SIGN OF GEMINI - TH
E TWINS. MANY DIFFERENT C
AREERS APPEAL TO YOU - IF YOU DO
NOT SUCCEED, IT IS NOT DO TO L
ACK OF TALENT, BUT BECAUSE YOU

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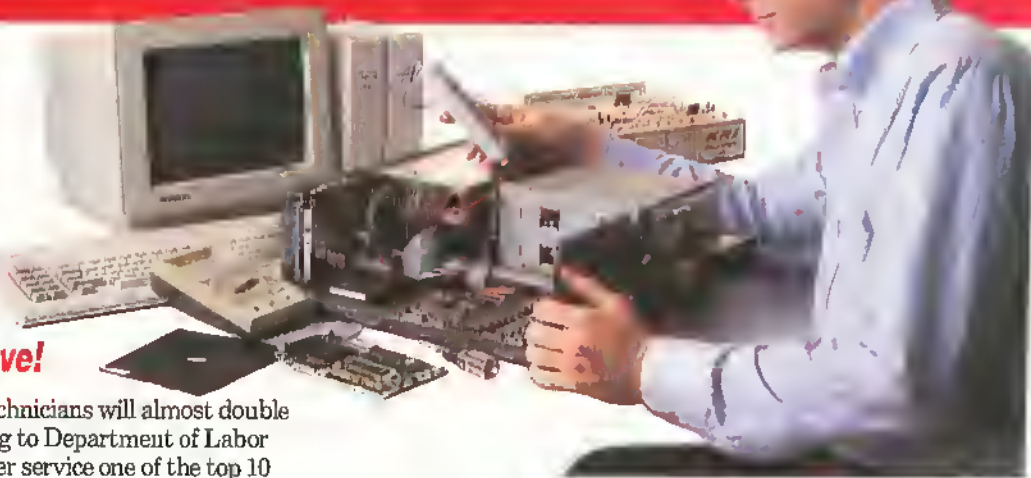
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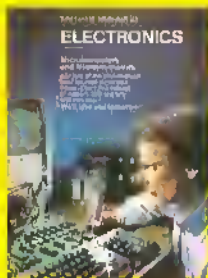


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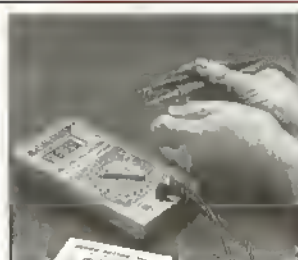
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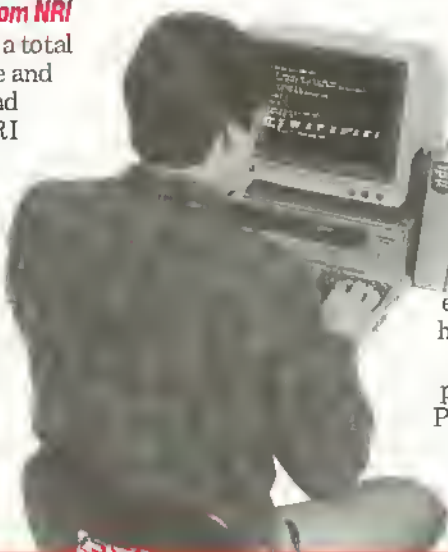


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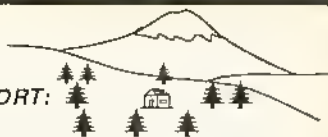
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Each includes a durable, fully enclosed metal housing, 100 page user manual, and software for use with HYPER-I/O or OS9. The CoCo XT-RTC adds a battery-powered real time clock/calendar for OS9 and BASIC.

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CoCo XT-RTC \$99.95

Technical Summary:

NO HALT • 1 or 2 hard drives • 30% faster than SASI • Uses PC-type hard disk drives & controllers • 5 Meg to 120 Meg per drive • Does not use interrupts • Multi-PAK recommended • Works with 12 Volt Y-cables • Includes EZGen boot file editor for easy installation

*Share your hard disk between BASIC and OS9 with HYPER-I/O
(not included)*

The Professional Touch: XT-ROM 2.3

Install XT-ROM in your CoCo XT hard disk controller's BIOS ROM socket. It automatically boots and reboots OS9 from your hard disk.

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Use "wildcards" with most OS9 commands, or rearrange your directory tree. Features recursive directory searches. A hard disk must! \$19.95

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Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too. \$19.95

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Contact Frank Hogg Labs, Howard Medical Computers, or MicroCom Technologies for information about complete Burke & Burke hard disk systems

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by Kevin Besser

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CANNOT DECIDE WHAT TO DO."

4011 IFZO=3THENPRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4012 IFZO=3THENCLS:PRINT"ANYTHING CALLING FOR AN ALERT MIND SUITS YOUR TASTES. IN LOVE YOU ARE SENSITIVE BUT FICKLE AND YOU BLAME YOUR OWN CHANGES OF HEART ON OTHERS - YOU MUST CONCENTRATE ON MAKING MARRIAGE"

4013 IFZO=3THENPRINT"HAPPY. CONTROL YOUR QUICK TEMPER - RASH WORDS IN HASTE WILL BE YOUR UNDOING. THE BEST OUTLET FOR YOUR RESTLESSNESS IS HOBBIES - IF YOU NEED A CHANGE - TAKE UP A NEW HOBBY.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4015 IFZO=4THENPRINT"YOU WERE BORN UNDER THE SIGN OF CANCER - THE CRAB. YOU WORRY TOO MUCH ABOUT WHAT OTHERS THINK - CONTROL YOUR EMOTIONS.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4016 IFZO=4THENCLS:PRINT"YOU ARE FULL OF SELF-DOUBT AND SHYNESS, BUT OTHERS PLACE GREAT CONFIDENCE IN YOU. YOU WILL GIVE AND RECEIVE DEEP, LOYAL AFFECTION - ONLY MARRY FOR LOVE - WITHOUT IT YOU WILL NOT BE"

4017 IFZO=4THENPRINT"CONTENT. CHOOSE A CAREER THAT BRINGS YOU INTO CONTACT WITH PEOPLE AND ACTIVITY. IF YOU DO NOT WORRY TOO MUCH - YOUR HEALTH WILL BE GOOD.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4020 IFZO=5THENPRINT"YOU WERE BORN UNDER THE SIGN OF LEO - THE LION. THE WORLD LOOKS TO YOU FOR LEADERSHIP AND GUIDANCE.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4021 IFZO=5THENCLS:PRINT"BEWARE OF PEOPLE WHO AGREE WITH YOU, JUST BECAUSE THEY WANT FAVORS FROM YOU. CONTROL YOUR TENDENCY TO DOMINEER - PEOPLE ARE EASIER LED THAN DRIVEN. IN WHATEVER CAREER YOU CHOOSE - YOU"

4022 IFZO=5THENPRINT"WILL BE AN EXECUTIVE. YOU WILL NEVER HAVE TRIVIAL LOVE AFFAIRS - AND YOUR MARRIAGE WILL BE HAPPY IF YOU AVOID DOMESTIC QUARRELS.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4025 IFZO=6THENPRINT"YOU WERE BORN UNDER THE SIGN OF VIRGO - THE VIRGIN. YOUR LIFE WILL NOT BE

WASTED - AND YOU WILL NEVER REGRET WHAT YOU HAVE DONE.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4026 IFZO=6THENCLS:PRINT"IF YOU ACHIEVE FAME - YOU WILL EARN IT. YOUR GREATEST SUCCESS WILL BE IN A CAREER REQUIRING PATIENCE. USE TACT WITH OTHERS - DO NOT BE OVER CRITICAL. MARRY EARLY IN LIFE - AND DO NOT"

4027 IFZO=6THENPRINT"INSIST ON ALWAYS HAVING YOUR WAY.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4030 IFZO=7THENPRINT"YOU WERE BORN UNDER THE SIGN OF LIBRA - THE BALANCE. YOU ARE ABLE TO GET ALONG WITH PEOPLE EASILY - THIS HELPS YOU MAKE FRIENDS AND SUCCEED IN BUSINESS.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4031 IFZO=7THENCLS:PRINT"YOU WILL MAKE A GOOD EXECUTIVE OR MANAGER. NEVER LISTEN TO ADVICE TO USE FORCE - YOU WILL SUCCEED BETTER BY USING REASON AND PERSUASION. IN LOVE YOU MUST REMEMBER THAT EMOTIONS AND"

4032 IFZO=7THENPRINT"NOT REASON ARE THE SOURCE OF PEOPLE'S ACTIONS. IN MARRIAGE YOUR SPOUSE DEMANDS ALL OF YOUR AFFECTION AND WILL RESENT YOUR INTEREST TO OTHERS OF THE OPPOSITE SEX.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4035 IFZO=8THENPRINT"YOU WERE BORN UNDER THE SIGN OF SCORPIO - THE SCORPION. YOU WERE BORN TO FIGHT HARD, LOVE DEEPLY, AND HATE BITTERLY.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4036 IFZO=8THENCLS:PRINT"FOR PEACE OF MIND - YOU MUST CONTROL YOUR TEMPER, CONTROL YOUR VIOLENT HATES, AND DO NOT GIVE IN TO SUSPICION OR JEALOUSY. NO ONE WILL ACCUSE YOU OF LYING DOWN ON THE JOB. YOU WILL"

4037 IFZO=8THENPRINT"SUCCEED IN MANY LINES OF ACTIVITY. YOU WILL ATTRACT THE OPPOSITE SEX - BUT YOUR GREATEST PITFALL IS JEALOUSY.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN\$

4040 IFZO=9THENPRINT"YOU WERE BORN UNDER THE SIGN OF SAGITTARIUS - THE ARCHER. YOU HAVE A GOOD CHANCE TO ACHIEVE SUCCESS AND


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FAME.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4041 IFZO=9THENCLS:PRINT"SELECT A CAREER WHERE YOU DO NOTWORK WITH TOO MANY OTHERS. YOU WILL SELDOM QUARREL, BUT WILL FLARE UP IF CROSSED. YOU WILL HAVE GOOD LUCK IF YOU FOLLOW YOUR INSTINCTS. IN LOVE NO ONE"
4042 IFZO=9THENPRINT"WILL YOU LIVE UP TO YOUR IDEAL- LEARN TO LOOK AT THE GOOD QUALITIES AND OVERLOOK THE FAULTS.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4045 IFZO=10THENPRINT"YOU WERE BORN UNDER THE SIGN OF CAPRICORN - THE SEA-GOAT. YOU MUST DEVELOPE A SENSE OF HUMOR.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4046 IFZO=10THENCLS:PRINT"BE CAREFUL NOT TO MISS OUT ON OPPORTUNITIES WHICH REQUIRE IMAGINATION AND DARING. CHOOSE A CAREER WHICH REQUIRES A STEADY, LEVEL HEAD. IN LOVE YOU ARE CAUTIOUS AND HESITANT - YOU"
4047 IFZO=10THENPRINT"WILL YOU PROBABLY NOT MARRY EARLY - BUT TO BE HAPPY - YOU MUST MARRY. GET PLENTY OF FRESH AIR, AVOID WORRY, AND WATCH YOUR USE OF ALCOHOL AND TOBACCO.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4050 IFZO=11THENPRINT"YOU WERE BORN UNDER THE SIGN OF AQUARIUS - THE WATER-BEARER. YOU HAVE MANY GOOD QUALITIES, SO YOU MUST OVERCOME YOUR SHYNESS IN HUMAN RELATIONSHIPS.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4051 IFZO=11THENCLS:PRINT"YOU HAVE AN ORIGINAL MIND - RELY ON YOUR HUNCHES. YOU DO NOT MAKE FRIENDS QUICKLY - BUT YOU WILL NEVER LACK FOR THEM - YOU MUST BE PATIENT WITH THOSE NOT AS QUICK AS YOU. YOUR EASY"
4052 IFZO=11THENPRINT"GOING DISPOSITION COULD LESSEN YOUR SUCCESS, BUT MANY CAREERS HOLD OPPORTUNITIES FOR YOU. IN LOVE YOU HIDE YOUR AFFECTIONS - YOU MAY MARRY WITHOUT A ROMANTIC COURTSHIP.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4055 IFZO=12THENPRINT"YOU WERE BORN UNDER THE SIGN OF PISCES - THE FISHES. YOUR LIFE WILL BE FILLED WITH RESTLESS ACTIVITY."

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":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4056 IFZO=12THENCLS:PRINT"YOU ARE VERY EASILY TAKEN ADVANTAGE OF. YOUR FRIENDS OVERLOOK YOUR FAULTS AND HAVE GENUINE AFFECTION FOR YOU. WITH SELF-DISCIPLINE YOU CAN RISE TO GREAT HEIGHTS - CHOOSE A CAREER"
4057 IFZO=12THENPRINT"THAT DEALS WITH NUMBERS OF INDIVIDUALS. YOU WILL PROBABLY MARRY EARLY - HAVE SEVERAL LOVE AFFAIRS - SOME MAYBE AFTER YOU HAVE MARRIED.":PRINT:LINEINPUT"PRESS enter TO CONTINUE...";YN$
4060 CLS:RETURN
4500 '*** DECAN ANSWERS
4501 IFZO=1ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF MARCH OR UNDER CANCER OR SAGITTARIUS. LUCKY COLORS ARE RED AND YELLOW, BEST DAY IS FRIDAY, AND GOOD FORTUNE NUMBER IS 2"
4502 IFZO=1ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER ARIES, LEO OR SAGITTARIUS. LUCKY COLORS ARE TAN AND ORANGE, BEST DAY

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IS TUESDAY, AND GOOD FORTUNE NUMBER IS 8."

4503 IFZO=1ANDDE=3THENPRINT"MARRY SOMEONE BORN IN FIRST HALF OF APRIL OR UNDER LEO OR SAGITTARIUS. LUCKY COLORS ARE YELLOW, LIGHT GREEN AND BLUE, BEST DAY IS MONDAY, AND GOOD FORTUNE NUMBER IS 1."

4504 IFZO=2ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF APRIL OR AUGUST OR UNDER CAPRICORN. LUCKY COLORS ARE YELLOW AND ORANGE, BEST DAY IS FRIDAY, AND GOOD FORTUNE NUMBER IS 5."

4505 IFZO=2ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER TAURUS OR CAPRICORN. LUCKY COLORS ARE PALE GREEN AND BLUE, BEST DAY IS TUESDAY, AND GOOD FORTUNE NUMBER IS 6."

4506 IFZO=2ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER TAURUS, VIRGO OR CAPRICORN. LUCKY COLORS ARE BLUE, GRAY, AND BROWN, BEST DAY IS TUESDAY, AND GOOD FORTUNE NUMBER IS 6."

4507 IFZO=3ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF MAY, SEPTEMBER OR JANUARY. LUCKY COLORS ARE BLUE, GREEN AND GRAY, BEST DAY IS WEDNESDAY, AND GOOD FORTUNE NUMBER IS 6."

4508 IFZO=3ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER LIBRA OR AQUARIUS. LUCKY COLORS ARE GREEN, YELLOW AND PALE BLUE, BEST DAY IS WEDNESDAY, AND GOOD FORTUNE NUMBER IS 5."

4509 IFZO=3ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER LIBRA OR AQUARIUS. LUCKY COLORS ARE GOLDEN TAN AND GRAYISH BLUE, BEST DAY IS WEDNESDAY, AND GOOD FORTUNE NUMBERS ARE 8 AND 5."

4510 IFZO=4ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF JUNE, OCTOBER OR FEBRUARY. LUCKY COLORS ARE LIGHT YELLOW, BLUE AND GREEN, BEST DAY IS MONDAY, AND GOOD FORTUNE NUMBER IS 2."

4511 IFZO=4ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER SCORPIO OR PISCES. LUCKY COLORS ARE VIOLET AND GREEN, BEST DAY IS MONDAY, AND GOOD FORTUNE NUMBERS ARE 2 AND 5."

4512 IFZO=4ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER CANCER, SCOR

PIO OR PISCES. LUCKY COLORS ARE SILVER GRAY AND VIOLET, BEST DAYS ARE MONDAY AND WEDNESDAY, AND GOOD FORTUNE NUMBER IS 3."

4513 IFZO=5ANDDE=1THENPRINT"MARRY SOMEONE BORN UNDER ARIES OR SAGITTARIUS OR IN LAST HALF OF JULY. LUCKY COLORS ARE GREEN, ORANGE AND GOLD, BEST DAY IS SUNDAY, AND GOOD FORTUNE NUMBER IS 1."

4514 IFZO=5ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER ARIES, LEO OR SAGITTARIUS. LUCKY COLORS ARE PURPLE AND GOLD, BEST DAY IS SUNDAY, AND GOOD FORTUNE NUMBER IS 2."

4515 IFZO=5ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER ARIES, LEO OR SAGITTARIUS. LUCKY COLORS ARE APRICOT, SCARLET AND VERMILION, BEST DAY IS THURSDAY, AND GOOD FORTUNE NUMBER IS 9."

4516 IFZO=6ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF APRIL, AUGUST OR DECEMBER. LUCKY COLORS ARE BLUE AND GREEN, BEST DAYS ARE SUNDAY AND TUESDAY, AND GOOD FORTUNE NUMBER IS 5."

4517 IFZO=6ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER TAURUS, VIRGO OR CAPRICORN. LUCKY COLORS ARE DARK BLUE AND SLATE, BEST DAY IS WEDNESDAY, AND GOOD FORTUNE NUMBER IS 4."

4518 IFZO=6ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER TAURUS, VIRGO OR CAPRICORN. LUCKY COLORS ARE LIGHT BLUE AND GREEN, BEST DAY IS SATURDAY, AND GOOD FORTUNE NUMBER IS 8."

4519 IFZO=7ANDDE=1THENPRINT"MARRY SOMEONE BORN IN LAST HALF OF JANUARY, MAY OR SEPTEMBER. LUCKY COLORS ARE PALE BLUE AND YELLOW, BEST DAY IS FRIDAY, AND GOOD FORTUNE NUMBER IS 6."

4520 IFZO=7ANDDE=2THENPRINT"MARRY SOMEONE BORN UNDER ANY SIGN EXCEPT SAGITTARIUS OR CANCER. LUCKY COLORS ARE GREEN AND PINK, BEST DAYS ARE FRIDAY AND MONDAY, AND GOOD FORTUNE NUMBER IS 6."

4521 IFZO=7ANDDE=3THENPRINT"MARRY SOMEONE BORN UNDER LIBRA, AQUARIUS OR GEMINI. LUCKY COLORS ARE PALE BLUE AND VIOLET, BEST DAY IS WEDNESDAY, AND GOOD FORTUNE NUMBER IS 5."

SUNDOG SYSTEMS

Warrior King

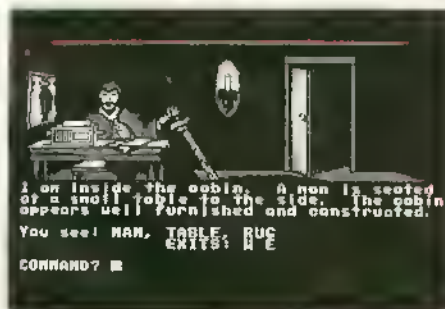


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Become RASTANN, Warrior King, on the quest to regain his rightful crown, hidden deep within a sinister land. Battle monsters, gain magic and weapons, and travel through harsh wilderness and dark castle dungeons in this medieval realm. From the creator of *Kung-Fu Dude* comes this awesome arcade game for the CoCo III! *Warrior King* uses the most detailed 320x200 16 color graphics and high speed machine code to vault you into a world of fantasy. Dare ye challenge the many perils ahead in order to become WARRIOR KING? Req. 128K CoCo III, disk drive, and joystick. Only \$29.95.

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— 2/88 Rainbow review



All programs CoCo 1, 2, 3 compatible, unless otherwise stated



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4522 IFZO=8ANDDE=1THENPRINT"MARRY
Y SOMEONE BORN IN LAST HALF OF J
ULY, OCTOBER OR FEBRUARY. LUCK
Y COLORS ARE RED AND PURPLE, BEST
DAY IS THURSDAY, AND GOOD FORT
UNE NUMBER IS 9."

4523 IFZO=8ANDDE=2THENPRINT"MARR
Y SOMEONE BORN UNDER CANCER, SCOR
PIO OR PISCES. LUCKY COLORS ARE
RED AND BROWN, BEST DAY IS TUES
DAY, AND GOOD FORTUNE NUMBER IS 3
."

4524 IFZO=8ANDDE=3THENPRINT"MARR
Y SOMEONE BORN UNDER CANCER, SCOR
PIO OR PISCES. LUCKY COLORS ARE
ROSE AND BLUE, BEST DAY IS MOND
AY, AND GOOD FORTUNE NUMBER IS 2
."

4525 IFZO=9ANDDE=1THENPRINT"MARR
Y SOMEONE BORN IN JULY, NOVE
MBER OR MARCH. LUCKY COLORS ARE
PURPLE AND YELLOW, BEST DAY IS M
ONDAY, AND GOOD FORTUNE NUMB
ER IS 3."

4526 IFZO=9ANDDE=2THENPRINT"MARR
Y SOMEONE BORN UNDER LEO, SAGI
TTARIUS OR ARIES. LUCKY COLO
RS ARE GREEN AND PURPLE, BEST
DAY IS TUESDAY, AND GOOD FORT
UNE NUMBER IS 4."

4527 IFZO=9ANDDE=3THENPRINT"MARR
Y SOMEONE BORN UNDER ARIES, LEO
OR SAGITTARIUS. LUCKY COLO
RS ARE GOLDEN BROWN, MAGENTA AND
PUCE, BEST DAY IS SUNDAY, AND
GOOD FORTUNE NUMBER IS 8."

4528 IFZO=10ANDDE=1THENPRINT"MARR
Y SOMEONE BORN IN LAST HALF OF
APRIL OR AUGUST. LUCKY COL
ORS ARE PURPLE AND BLUE, BEST DAY
IS SATURDAY, AND GOOD FOR
TUNE NUMBERS ARE 8 AND 5."

4529 IFZO=10ANDDE=2THENPRINT"MARR
Y SOMEONE BORN MID APRIL TO MID
MAY, MID AUGUST TO MID SEP
TEMBER OR LAST HALF OF DEC
EMBER. LUCKY COLORS ARE BLUE AND
RED, BEST DAYS ARE SATURDAY AND
FRIDAY, AND GOOD FORTUNE NUM
BERS ARE 8 AND 9."

4530 IFZO=10ANDDE=3THENPRINT"MARR
Y SOMEONE BORN UNDER TAURUS, VIR
GO OR SAGITTARIUS. LUCKY COL
ORS ARE DEEP BLUE AND GRAY, BES
T DAY IS WEDNESDAY, AND GOOD FOR
TUNE NUMBERS ARE 8 AND 4."

4531 IFZO=11ANDDE=1THENPRINT"MARR
Y SOMEONE BORN IN JANUARY OR UND
ER VIRGO OR LIBRA. LUCKY COL
ORS ARE BLUE AND GREEN, BEST DAY
IS SATURDAY, AND GOOD FOR

TUNE NUMBER IS 7."

4532 IFZO=11ANDDE=2THENPRINT"MARR
Y SOMEONE BORN UNDER GEMINI OR
LIBRA OR IN LAST HALF OF JAN
UARY. LUCKY COLORS ARE DARK BLU
E AND GREEN, BEST DAY IS SAT
URDAY, AND GOOD FORTUNE NUM
BER IS 9."

4533 IFZO=11ANDDE=3THENPRINT"MARR
Y SOMEONE BORN UNDER GEMINI, LIB
RA OR AQUARIUS. LUCKY COLORS ARE
BLUE AND GREEN, BEST DAY IS FRI
DAY, AND GOOD FORTUNE NUMBERS ARE
6 AND 9."

4534 IFZO=12ANDDE=1THENPRINT"MARR
Y SOMEONE BORN UNDER CANCER OR
IN LAST HALF OF SEPTEMBER OR OCT
OBER. LUCKY COLORS ARE PUR
PLE AND RED, BEST DAY IS TUE
SDAY, AND GOOD FORTUNE NUM
BERS ARE 4 AND 2."

4535 IFZO=12ANDDE=2THENPRINT"MARR
Y SOMEONE BORN UNDER CANCER OR
SCORPIO OR IN LAST HALF OF FEB
RUARY. LUCKY COLORS ARE MAU
VE, GREEN AND INDIGO, BEST DAY
IS THURSDAY, AND GOOD FOR
TUNE NUMBER IS 3."

4536 IFZO=12ANDDE=3THENPRINT"MARR
Y SOMEONE BORN UNDER CANCER, SCOR
PIO OR PISCES. LUCKY COLORS ARE
PURPLE AND RED, BEST DAY IS MON
DAY, AND GOOD FORTUNE NUMBER IS
3."

4550 PRINT:LINEINPUT"PRESS enter
TO CONTINUE...";YN\$

4560 RETURN

5000 GOTO 10000

10000 '*** END ROUTINE

10010 A\$="L8;E;F;G;P16;L8;G#;G;F
;P16"

10020 B\$="L2;E"

10030 CLS0

10040 PRINT@160,"

A"

10050 PRINT@224," P A U L D

B U R N H A M"

10060 PRINT@288," PRO
GRAM"

10070 X\$="XA\$;"

10080 FOR R=1 TO 3

10090 PLAY X\$

10100 NEXT R

10110 CLS0

10120 PRINT@224," COPYRIGHT
(C) 1989"

10130 X\$="XB\$;"

10140 PLAY X\$

10150 FOR D=1 TO 1000:NEXT D

10160 CLS

20000 END



Kill the evil wizard and escape. . .

Castle Zhagwhar

By Keith Schuler

In a different time far away, the small, magical kingdom of Lithana is thriving. It is a peaceful kingdom with a just king on the throne, a good economy and happy people.

One day an evil wizard arrives at an old, abandoned fortress outside the kingdom, called Castle Zhagwhar. He is a powerful wizard who wants to rule Lithana. So using his magical powers, he begins transforming entire forests into gigantic armies of vicious goblins who immediately begin attacking Lithana.

The king's army is powerful, but they can't resist the goblins for long. So the king sends a decree throughout the kingdom that anyone brave enough to enter Castle Zhagwhar and dispatch the wizard will receive one-fourth of all the land in Lithana.

The king waits many long weeks for a response to his decree when, at last, a poor young woodcutter named Gwydion answers the king's call. Gwydion is unskilled in the use of any weapons but is very strong and can run and jump well. The king in desperation gives the young man a map leading to Castle Zhagwhar, wishes him luck, and then returns to his throne to worry some more.

Gwydion follows the map for many days but sees no goblins. They are off fighting in other parts of Lithana. At last he reaches his destination, the decrepid old

fortress almost completely in shambles. The drawbridge is down and Gwydion enters. He comes to a staircase leading downwards and descends it. His adventure begins. . .

Castle Zhagwhar is a game that runs on the CoCos 1, 2 and 3 and requires 32K of memory. To play the game, type in the listing, save it to tape or disk, and run it. You will see the title page. Press any key and the game begins.

Gwydion is the little blue man. Control him using the right joystick. Moving the joystick left or right causes him to run left or right. To climb a ladder or move under the ladder, press the joystick up. To descend a ladder, move over it, then press the joystick down. Moving the joystick down anywhere else causes Gwydion to duck. To make him jump, press the joystick button.

The idea of the game is to move from room to room by collecting yellow keys and using them to open the blue doors. To pick up a key, just run over it, and a key is shown in your possession in the blue bar at the top of the screen. To open a door, get a key, then run into the door.

Also found throughout the castle are pots of gold worth 100 points. Pick these up by running over them. Keys are worth 50 points; moving on to the next room, 350 points. The score is shown in the blue bar in the upper left-hand corner of the screen.

Castle Zhagwhar is very old, so the ladders are brittle and there are many holes in the floor. Jump over the holes, but never jump onto a ladder because it can break and may trap you in a room. There are also bats flying throughout the castle, biting any-

thing they touch, so duck to avoid them even though sometimes they don't do damage.

Falling one level through a hole causes Gwydion to lose 10 points of life, and getting bitten subtracts five points per bite. The amount of life Gwydion has left is shown as a green bar inside the blue bar in the upper right-hand corner of the screen. If the bar is reduced to zero, Gwydion dies.

Also found in the castle are magic transporters and disintegrators. When stepped on, the transporters cause Gwydion to automatically jump to another part of the room. The disintegrators cause instant death when stepped on.

Gwydion makes a deal with his fairy godmother that if he succeeds in reaching a certain point, he can summon her aid. To do this, you must accumulate a score of at least 4000 points, then press the space bar. Gwydion's life is then completely restored, but his fairy godmother sets him back a few rooms. Another life restorer is the Bonus Room. When Gwydion is in this room, collect all the treasure and escape before the red timer runs out, and his life will be completely restored.

Scattered around the castle are bottles of magic healing elixer that Gwydion does not see right away. When he notices one, he automatically drinks it. Elixer cures five points of damage. Going to the next room also cures five points.

Deep within Castle Zhagwhar is the evil wizard. He knows the young man is after him and is constantly searching for him with a magic crystal ball. If he finds Gwydion, he puts a curse on him that drains

Keith Schuler is a high school student who has been programming for seven years. He has learned other computer languages including assembly and C, and intends to become a computer programmer for NASA.

the lad's life. So don't waste time! But that's not the only spell the wizard knows. He can throw fireballs, disintegrate the inanimate, cause things to disappear, magically transport himself, and summon bats. Just remember, when the wizard dies, all his spells stop working.

The castle is difficult to navigate through,

making it hard to find and defeat the wizard. Escaping Castle Zhagwhar is even harder. Good luck.

I hope you enjoy playing this game as much as I enjoyed programming it. Now Gwydion is prepared, the castle is before you. . . art thou ready?

[Note: To run this program on the CoCo

3, change POKE 65495.0 in Line 80 to POKE 65497.0.]

(Questions or comments about this program may be sent to the author at 325 St. Pierre Ct., Merritt Island, FL 32953. Be sure to send an SASE when requesting a reply.)

110	84	450	232	910	248
140	100	500	55	960	205
190	114	580	236	1040	194
230	239	640	164	1100	239
310	93	700	32	1160	242
35	62	790	129	1200	174
400	123	830	113	END	140

The Listing: ZHAGWHAR

```

10 *****
20 *
30 * CASTLE ZHAGWHAR
40 *
50 * BY: KEITH SCHULER
60 *
70 * COPYRIGHT (C) 1989
80 *
90 * FALSOFT INCORPORATED
100 *****
110 POKE65495,0:X=RND(-TIMER):CLEAR15:PCLEAR2:PMODE1,1:PCLS:DIMR
120 R(11,15),RL(11,15),ST(11,15),DU(
130 11,15),FB(11,5),FL(40,8),BA(11,6
140 ),MA(5),MB(5),MO$(5),BL(11,15),P
150 A(10),PB(10):CLS:PRINT@192," *
160 * PLEASE WAIT ONE MOMENT ** ";
170 DRAW"C3BM3,14E2U2RF2ND2H2LU4L
180 2G2NDE2R2DNR4U4C2U2R2D2C3BM28,14
190 H2U2LG2ND2E2RU4R2F2NDH2L2DNL4U4C
200 2U2L2D2BM3,31C3U2E2F2ND2H2U4L2NG
210 2R2R2NF2L2U2C2H2E2F2G2NU2":GET(3
220 1,0)-(20,15),RL,G:GET(0,0)-(11,1
230 5),RR,G:GET(0,16)-(11,31),ST,G
240 100 DRAW"C3BM1,47E4L2C2U2L2D2R2R
250 2C3R4D2G2R4BM18,32D3G2H2NU3F2D4R
260 2NE2L2L2NH2R2D2C2G2F2E2H2D2BM100
270 ,100NR11R2U2NR4D4NR4":GET(0,32)-
280 (11,47),DU,G:GET(100,98)-(111,10
290 3),FB,G
300 110 LA$="C3D24NR8U4NR8U4NR8U4NR8
310 U4NR8U4R8NU4D20":COLOR4:LINE(0,0
320 )-(40,6),PSET,B:COLOR2:LINE(0,2)
330 -(40,4),PSET,BF:FORT=0TO40STEP4:
340 PSET(T,2,4):PSET(T+2,4,4):NEXTT:

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GET(0,0)-(40,6),FL,G
120 DRAW"C3BM100,50U2R4ND4R2ND4R
130 4D2":GET(100,48)-(111,54),BA,G:P
140 CLS:M$(1)="T803CDEFG":M$(2)="O1T
150 100FGFGABABCD":M$(3)="O1T3L4CP96
160 CL3FL4P24CFAP64CFAP64CFAFAO2CO1A
170 FCP64CP96CL3F":M$(4)="O3T6CDEGP8
180 DT5G"
190 130 DRAW"S4":PCLS3:FORT=80TO82:C
200 IRCLE(T,60),18,2,1,.15,.65:CIRCL
210 E(T+25,72),6,2,1,.15,.70:NEXTT:D
220 RAW"BM80,60C2NU14ND14BL3BD4NU11L
230 2NU11NM-3,+5R2U15E4R5NR5M+5,+4U2
240 BM105,66NM-4,-6M+6,+4D5NM-6,+4NF
250 4RNF4U12L2ND12NE4L2NE4NH2UH2NL4D
260 2L8"
270 140 DRAW"BM122,78NM+18,-19E2R4UN
280 L4R4D2NR6D2R4E4NU4L2U4NM-3,-2R2M
290 -4,-2L6NL4U2L6NU4R2U6R2D2NL2U4NR
300 4D2R8BE6BR8ND20G2ND18D2G2NR8G2NR
310 10R4D12F4U2NH4NE2U2H4BU18BR14ND2
320 2R2ND22NE4L2NE4NH2D22F4U2NH4E2BR
330 20BD2G2L8UNR6H2R2ND2NL4NU16L2U16
340 M+4,-2NM+8,+4D2M+8,+4M-10,+8"
350 150 DRAW"BM30,90E4NM+6,+2D2M+6,+
360 2M+18,-2NM-10,+12NM-14,+12M-12,+
370 12BL8NG4NR16G2R16NE4L8NM-14,+12L
380 2NM-12,+12M-10,+12NG2NM+18,-2M+1
390 8,-4L2F2NM+4,+4M+4,+2E4BF4NR6F2R
400 NU24R2U24NE2L2NH2R2D10E6NM+4,+5D
410 2M+4,+5ND16R2D16NM-8,+2U2M-8,+4"
420 160 FORT=91TO93:CIRCLE(T,111),6,
430 2,1,.15,.70:NEXTT:DRAW"BM91,104N
440 M-4,-6M+6,+4D5NM-6,+4NF4RNF4U12L
450 2ND12NE4L2NE4NH2UH2NL4D2L8BR24BU
460 2ND10R2ND10NR8E2R6ND15F2ND17R2NE
470 2R2NE2L4D17M+4,+4L2NM-4,-4R2D4G2
480 NL2U2L13NG2E2NR10R2BU12M+6,+3BR1
490 6U15M-2,-4NM+2,-4R2M+2,+4D15
500 170 DRAW"NM+6,+4L2M+8,+4E2U12NM-
510 2,-4R2NM-2,-4D10NM+6,+4L2M+8,+4E
520 2U12NM-2,-4R2NM-2,-4D10BR5BD2NR6
530 F2RNU24R2U24NE2L2NH2R2D10E6NM+4,
540 +5D2M+4,+5ND16R2D16NM-8,+2U2M-8,
550 +4":FORT=190TO193:CIRCLE(T,111),
560 6,2,1,.15,.70:NEXTT
570 180 DRAW"BM191,104NM-4,-6M+6,+4D
580 5NM-6,+4NF4RNF4U12L2ND12NE4L2NE4
590 NH2UH2NL4D2L8BR26ND15NH4R2NH4D15
600 NF4D2NL2U15M+6,-5NF4ND2C1S8BM18,
610 4NR4D2R4D2NL4BR2U4R4D2NL4BD2BR2U

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2E2F2NL4D2BR2NR4U4R4BR2NR4D2NR2D
2R4BR2NR4U4R4BR2NR4D4R4NU4BR2U2E
2F2NL4D2BR2R4U2L4U2R4BR2R4L2"
190 DRAW"D4BU4BR6BD4R4U2L4U2R4BR
2ND4R4D4NL4BR2U2NR2U2R4BR2R4L2D4
BR4NU4R2NU2R2NU4BR2U2NR4E2F2D2BR
2U4R4D2L4R2F2BR2NR4U2NR2U2R4BM83
,16ND4R4D2NL4U2BR2ND4R4D2L4R2F2B
R2NR4U2NR2U2R4BR2NR4D2R4D2NL4BR2
NR4U2NR2U2R4BR2ND4F4U4BR2R4L2D4B
R4R4U2L4U2R4"
200 DRAW"BM36,150U4R3FGNL3FGNL3B
R5U2NH2E2BR6D4U2R2NE2F2BR2NR4U2N
R2U2R4BR2R4L2D4NL2R2BR4U4NL2R2BR
2D4U2R4NU2D2BR6R4U2L4U2R4BR2NR4D
4R4BR2U4D2R4NU2D2BR2NU4R4U4BR2D4
R4BR2NR4U2NR2U2R4BR2ND4R4D2L4R2F
2BM90,154GD2FBR2NR4U4R4BR2FD2GBR
9U4BR2ND2R4D2NL4D2BR2"
210 DRAW"NR4U2NR4U2R4ND4BR2R4G2D
2C4BM53,178ND4R4D2NL4U2BR2ND4R4D
2L4R2F2BR2NR4U2NR2U2R4BR2NR4D2R4
D2NL4BR2R4U2L4U2R4BR6BD4U2NR4E2F
2D2BR2U4F4U4BR2F2NE2D2BR10U4D2R2
NE2F2BR2NR4U2NR2U2R4BR2F2NE2D2":
SCREEN1,1
220 FORT=1TO2500:A$=INKEY$:IFA$=
""THENNEXTT
230 SCREEN0,0:DRAW"S4":SC=0:ST=2
50:S=1:WR=10:L1=63:L2=102:L3=143
:L4=182:FF=0:WW=1:FG=0
240 IF(S=5 OR S=10)AND TI>1 THEN
ST=250
250 TR=0:ON S GOTO 270,290,310,3
70,270,320,340,320,370,360,420
260 PMODEL,1:PCLS:SCREEN0,0:FORT
=6TO220STEP40:PUT(T,61)-(T+40,67
),FL,PSET:PUT(T,100)-(T+40,106),
FL,PSET:PUT(T,141)-(T+40,147),FL
,PSET:PUT(T,180)-(T+40,186),FL,P
SET:NEXTT:COLOR2:LINE(0,0)-(255,
20),PSET,B:PAINT(10,10),3,2:RETU
RN
270 GOSUB260:FORT=1TO3:READLX,LY
:DRAW"BM"+STR$(LX)+", "+STR$(LY)+
LA$:NEXTT:DATA230,139,10,98,210,
58,60,139,8,98,62,58,30,139,90,1
39,190,139,234,99,148,99,10,58,2
00,139,10,98,210,58
280 LINE(118,30)-(131,160),PRESE
T,BF:GOTO510
290 GOSUB260:FORT=1TO3:READLX,LY
:DRAW"BM"+STR$(LX)+", "+STR$(LY)+
LA$:DRAW"BM"+STR$(LX+170)+", "+ST
R$(LY)+LA$:NEXTT
300 LINE(82,70)-(166,190),PRESET
,BF:GOTO510
310 GOSUB260:LINE(61,98)-(72,147
),PRESET,BF:LINE(46,179)-(84,191
),PRESET,BF:LINE(110,139)-(140,1

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47),PRESET,BF:FORT=1TO6:READLX,L
Y:DRAW"BM"+STR$(LX)+", "+STR$(LY)
+LA$:NEXTT:LINE(169,99)-(200,110
),PRESET,BF:GOTO510
320 GOSUB260:COLOR2:LINE(42,141)
-(207,141),PSET:COLOR1:LINE(45,1
74)-(59,191),PSET,BF:LINE(90,174
)-(98,191),PSET,BF:LINE(106,174)
-(118,191),PSET,BF:LINE(170,174)
-(158,191),PSET,BF:LINE(192,174)
-(206,191),PSET,BF:LINE(55,136)-
(195,147),PSET,BF
330 LINE(195,107)-(115,100),PSET
,BF:LINE(50,58)-(70,68),PSET,BF:
FOR T=1TO5:READLX,LY:DRAW"BM"+ST
R$(LX)+", "+STR$(LY)+LA$:NEXTT:GO
TO510:DATA230,139,10,98,38,58,23
0,58,74,58
340 GOSUB260:COLOR1:LINE(40,175)
-(255,191),PSET,BF:LINE(45,134)-
(59,151),PSET,BF:LINE(90,134)-(9
8,151),PSET,BF:LINE(106,134)-(11
8,151),PSET,BF:LINE(170,134)-(15
8,151),PSET,BF:LINE(192,134)-(20
6,151),PSET,BF:LINE(70,54)-(200,
70),PSET,BF
350 LINE(135,90)-(200,120),PSET,
BF:DRAW"C2BM245,100L12":FORT=1TO
3:READLX,LY:DRAW"BM"+STR$(LX)+",
"+STR$(LY)+LA$:NEXTT:GOTO510:DAT
A205,58,220,98,10,139,230,139,10
,98,38,58,230,58,74,58
360 GOSUB260:COLOR1:LINE(135,58)
-(195,191),PSET,BF:LINE(65,58)-
(79,160),PSET,BF:DRAW"C3BM37,180R
14BM65,180R14BM88,180R14C2BM215,
180R14":FORT=1TO3:READLX,LY:DRAW
"BM"+STR$(LX)+", "+STR$(LY)+LA$:N
EXTT:GOTO510:DATA12,99,121,58,12
1,139
370 PCLS1:DRAW"S8BM70,90C3NR3D4R
3EHN13EHBR3NR4D4R4NU4BR2U4F4U4BR
2D4R4U4BR2NR4D2R4D2NL4BR6U4R4D2L
4R2F2BR2NR4U4R4D4BR2NR4U4R4D4BR2
U4F2E2D4BR2BU4D2BD2RC1D":FORT=1T
O65STEP4:COLOR2:LINE(T,T)-(256-T
,192-T),PSET,B:COLOR4
380 LINE(T+2,T+2)-(256-(T-2),192
-(T-2)),PSET,B:NEXTT:SCREEN1,0:P
LAY"T4L4V3103L16.;1;L32;1;L16.;1
;L32;1;L16.;1;L32;1;L16.;1;L32;5
;L16.;8;L32;5;L16.;8;L32;5;L16.;
8;L32;5;L4;1":FORT=1TO500:NEXTT:
LF=ST:TI=82:GOSUB260
390 DRAW"S4":COLOR4:LINE(0,24)-
(80,24),PSET:COLOR1:LINE(100,139)
-(130,147),PSET,BF:LINE(45,179)-
(80,191),PSET,BF:LINE(148,90)-(2
00,147),PSET,BF:DRAW"BM11,139"+L
A$:DRAW"BM136,139"+LA$:DRAW"BM86

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,139"+LA$:DRAW"BM136,99"+LA$:DRA
W"BM204,99"+LA$
400 LINE(0,99)-(70,106),PRESET,B
F:DRAW"BM236,59"+LA$:DRAW"BM74,5
9"+LA$
410 GOTO 510
420 GOSUB260:LINE(0,22)-(255,191
),PRESET,BF:DRAW"S8C2BM36,34NR4D
4R4BR2NR4U4R4D4BR2U4F4U4BR2BD4R4
U2NL2D2L4U4R4BR2ND4R4D2L4R2F2BR2
U2NR4E2F2D2BR4U4NL2R2BR2D4R4U4BR
2D4R4BR2U2NR4E2F2D2BR4U4NL2R2BR2
R4L2D4NL2R2BR2NR4U4R4D4BR2U4F4U4
BR2BD4R4U2L4U2R4BR2D2BD2UC1R"
430 GOSUB660:PLAY"O2T5V31L1GCL2E
GL3.AL4EL1AO3CL2DO2GO3L1C":DRAW"
C4S8BM20,65R4L2D4BR4U4D2R4NU2D2B
R2NR4U2NR2U2R4BR6D4R2NU2R2U4BR2R
4L2D4NL2R2BR2NR4E4NL4BR2BD4U2NR4
E2F2D2BR2U4R4D2L4R2F2BR2U4R3FD2G
NL3BR7U4D2R4U2D4BR2U2NR4E2F2D2BR
2R4U2L4U2R4BR6D4R3EHN13EH
440 DRAW"NL3BR3NR4D2NR2D2R4BR2NR
4U2NR2U2R4BR2ND4F4U4BM0,80NR4D2R
4D2NL4BR2NU4R4U4BR2NR4D4R4BR2NR4
U4R4BR2NR4D2NR2D2R4BR2R4U2L4U2R4
BR2NR4D2R4D2NL4BR2U2NR2U2R4BR2D4
R4U4BR2D4R4BR2NU4R4BR3U2NH2E2BR5
D4R3EU2HNL3BR3NR4D2NR2D2R4BR2R4U
2L4U2R4BR2R4L2D4BR4U4R4D2L4"
450 DRAW"R2F2BR2NR4U4R4D4BR4U2NH
2E2BR2NR4D2NR2D2R4BR2NU4R3EU2HNL
3C3":PLAY"O2AL2O3CO2AGABO3CO2F#A
O3DCL4O2BP4L2GFD":DRAW"BM4,110U2
NR4E2F2D2BR2U4F4U4BR2NR3D4R3EU2N
HBUBR6F2NE2D2BR4NR4U4R4D4BR2NU4R
4U4BR6NR4D2R4D2NL4"
460 DRAW"BR2U2NR4E2F2D2BR2U2NR2U
2R4BR2NR4D2NR2D2R4BR2BU4D4R4BR4U
2NH2E2BR4NR4D2NR2D2R4BR2R4U2L4U2
R4BR2NR4D4R4BR2U2NR4E2F2D2BR2U4R
4D2NL4U2BR2NR4D2NR2D2R4BR2NU4R3E
U2HL3BM38,118NR4D4R4BR2U2NR4E2F2
D2BR2R4U2L4U2R4BR2R4L2D4BR4NU4R4
BR2NR4U2NR2U2R4BR6"
470 DRAW"R4G4R4BR2U4D2R4NU2D2BR2
U2NR4E2F2D2BR2R4U2NL2D2L4U4R4BR2
D4R2NU2R2U4BR2D4U2R4NU2D2BR2U2NR
4E2F2D2BR2U4R4D2L4R2F2":PLAY"O3L
1CL2EGL3AP4EL1AO4L1CL2DO3GO4L1C"
:DRAW"C4BM34,140D4R4BR2R4L2U4NL2
R2BR2R4L2D4BR4U4D2R4NU2D2BR2U2NR
4E2F2D2BR2U4F4U4BR2BD4U2NR4E2
480 DRAW"F2D2BR6R4L2U4NL2R2BR2NR
4D2R4D2NL4BR6R4U2L4U2R4BR2BD4U2N
R4E2F2D2BR2BU4D2F2E2U2BR2NR4D2NR
2D2R4BR2NU4R3EU2HL3BR6D4UC1R":CO
LOR3:LINE(34,152)-(218,152),PSET
:PLAY"O3AL2O4CO3AGABO4CL4EP8L8GL
4F#GO4DP8O3L8GL4F#GL1O4CCC"
490 DRAW"C2BM85,170R4L2D4BR4U4D2

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R4NU2D2BR2NR4U2NR2U2R4BR6NR4D2NR
2D2R4BR2U4F4U4BR2NR3D4R3EU2"
500 FORT=1TO6000:IF INKEY$="" TH
EN NEXT T:CLS:END ELSE CLS:END
510 PN=2:TR=0:ON S GOSUB 530,540
,550,590,530,560,580,560,590,570
:PB$="S2C3NR10U2L2NR14U2L2NR18U2
L2NR22U2NR22U2NR22U2NR22U2NR22BU
2BR2C2R18L2U2L14R2U2R10":FORT=1T
O PN:DRAW"BM"+STR$(PA(T))+", "+ST
R$(PB(T))+PB$:NEXTT
520 GOTO 600
530 TN(1)=0:TN(2)=0:TN(3)=0:PA(1
)=100:PB(1)=179:PA(2)=190:PB(2)=
99:X=10:Y=164:KA=20:KB=53:LA=235
:LB=43:RETURN
540 PA(1)=40:PB(1)=99:PA(2)=184:
PB(2)=99:X=10:Y=164:KA=128:KB=53
:LA=190:LB=163:RETURN
550 PA(1)=50:PB(1)=139:PA(2)=128
:PB(2)=99:X=10:Y=164:KA=210:KB=9
3:LA=235:LB=43:RETURN
560 RA=45:RB=124:PA(1)=100:PB(1)
=99:PA(2)=10:PB(2)=59:X=10:Y=164
:KA=140:KB=53:LA=198:LB=83:RETUR
N
570 PA(1)=238:PB(1)=99:PA(2)=238
:PB(2)=139:X=10:Y=44:LA=7:LB=164
:KB=53:KA=235:WY=Y:RETURN
580 PA(1)=238:PB(1)=99:PA(2)=238
:PB(2)=139:X=35:Y=164:KA=50:KB=5
3:LA=235:LB=43:RA=12:RB=44:RETUR
N
590 PN=10:PA(1)=58:PB(1)=139:PA(
2)=220:PB(2)=139:PA(3)=238:PB(3)
=179:PA(4)=220:PB(4)=99:PA(5)=19
8:PB(5)=179:PA(6)=12:PB(6)=59:PA
(7)=42:PB(7)=59:PA(8)=102:PB(8)=
99:PA(9)=108:PB(9)=59:PA(10)=190
:PB(10)=59:X=34:Y=164:LA=232:LB=
123:KA=115:KB=173:RETURN
600 DRAW"S4BM"+STR$(KA)+"", "+STR$
(KB)+"C2D4L2U2NU2R8D2":DRAW"BM"+
STR$(LA)+"", "+STR$(LB)+"C3BD2ND13
E2R7F2D13L9":PAINT(LA+2,LB+2),3,
3:DRAW"BM"+STR$(LA+2)+"", "+STR$(L
B+8)+"C1R2C3D":RN=0:BN=0:ON S GO
TO 660,610,620,660,620,660,640,6
20,660,630
610 BN=2:BX(1)=10:BY(1)=44:BD(1)
=1:BX(2)=230:BY(2)=44:BD(2)=0:GO
TO650
620 BN=2:BX(1)=10:BY(1)=124:BD(1
)=0:BX(2)=100:BY(2)=44:BD(2)=0:IF
S=4 THEN BX(1)=31:GOTO650 ELSE
IF S=7 THEN BY(1)=84:GOTO650 ELS
E GOTO650
630 BN=4:BX(1)=70:BY(1)=84:BD(1)
=1:BX(2)=120:BY(2)=44:BD(2)=0:BX
(3)=100:BY(3)=124:BD(3)=1:BX(4)=
100:BY(4)=164:BD(4)=1:GOTO650

```



```

640 BN=2:BX(1)=120:BY(1)=44:BD(1)
)=0:BX(2)=100:BY(2)=124:BD(2)=1:
GOTO650
650 IFBN>0THENFORT=1TOBN:PUT(BX(
T),BY(T))-(BX(T)+11,BY(T)+6),BA,
PSET:NEXTT
660 DRAW"BM6,6C1S8NR4D2R4D2NL4BR
2NR4U4R4BR2ND4R4D4NL4BR2U4R4D2L4
R2F2BR2NR4U2NR2U2R4BR2BDRBD2LRC3
U3BR40C1D4R4BR2R4L2U4NL2R2BR2NR4
D2NR2D2BR6NR4U2NR2U2R4BR2BDRBD2L
RC3U4":SCREEN1,0:FORT=200TOST:DR
AW"BM"+STR$(T)+"",13C1S4NU4":PLAY
"T255L255O3A":PLAY"T4L4"
670 NEXTT:IFS=1THENDRAW"C2S8BM73
,30NR4D4R4U2NL2D2BR2U4R4D4NL4BR2
NR4U4R4D4BR2RU4NLR2FD2GNL2BR7NU4
R4BR2NU4R4NU4BR2NR4U4R4BR2D4U2R2
NE2F2BR3UBUU2D3C1R":PLAY"O2L4T20
CP10DP10EP10P10CP10DP10EP10P10CP
10DP10EP10P10T2GG":FORT=1TO1000:
NEXTT
680 IFS=1 THEN LINE(73,30)-(200,
40),PRESET,BF
690 PO=0:KC=0:GOSUB1180:IF S=11T
HEN RETURN ELSETIMER=0
700 A=JOYSTK(0):B=JOYSTK(1):IFA>
10AND A<53 AND B>10AND B<53 AND PO
=0AND PEEK(65280)<>126 AND PEEK(
65280)<>256 THEN750
710 IF PEEK(65280)=254 OR PEEK(6
5280)=126 THEN780 ELSE 720
720 IFA<5 ANDX>7THENX=X-9:ST=ST-
.2:GOSUB1220:PUT(X+9,Y)-(X+20,Y+
15),BL,PSET:PUT(X,Y)-(X+11,Y+15)
,RL,PSET:PO=1:GOTO840
730 IFA<10 ANDX>2 THENX=X-4:PUT(
X+4,Y)-(X+15,Y+15),BL,PSET:PUT(X
,Y)-(X+11,Y+15),RL,PSET:PO=1:GOT
O840
740 IFA>10AND B>10AND A<53AND B<53T
HENPUT(X,Y)-(X+11,Y+15),ST,PSET:
PO=0:GOTO840
750 IFA>58 AND X<233AND S<>4THEN
X=X+9:ST=ST-.2:GOSUB1220:PUT(X-
10,Y)-(X+5,Y+15),BL,PSET:PUT(X,Y
)-(X+11,Y+15),RR,PSET:PO=2:GOTO8
40
760 IFA>53 ANDX<253-15THENX=X+4:
PUT(X-4,Y)-(X+11,Y+15),BL,PSET:P
UT(X,Y)-(X+11,Y+15),RR,PSET:PO=2
:GOTO840
770 GOTO810
780 IF A<10 OR A>53 THEN 790 ELS
EPUT(X,Y)-(X+11,Y+15),BL,PSET:PU
T(X,Y-15)-(X+11,Y),ST,PSET:ST=ST
-1:GOSUB1220:PLAY"T255O3;12;1":P
UT(X,Y-15)-(X+11,Y),BL,PSET:PUT(
X,Y)-(X+11,Y+15),ST,PSET:IFS=4 O
RS=9 THENST=ST+1:GOTO840 ELSEGOT
O840

```

```

790 IFA<10 THEN800ELSEIFX>217THE
N860 ELSEPUT(X,Y)-(X+11,Y+15),BL
,PSET:PUT(X+15,Y-15)-(X+26,Y),RR
,PSET:ST=ST-1:GOSUB1220:PLAY"T25
5O3;12;1":PUT(X+13,Y-15)-(X+24,Y
),BL,PSET:X=X+25:PUT(X,Y)-(X+11,
Y+15),RR,PSET:IFS=4 ORS=9 THENST
=ST+1:GOTO840ELSE840
800 IFX<29THEN 860 ELSEPUT(X,Y)-
(X+11,Y+15),BL,PSET:PUT(X-26,Y-1
5)-(X-15,Y),RL,PSET:ST=ST-1:GOSU
B1220:PLAY"T255O3;12;1":PUT(X-26
,Y-15)-(X-15,Y),BL,PSET:X=X-25:P
UT(X,Y)-(X+11,Y+15),RL,PSET:IFS=
4 OR S=9 THEN ST=ST+1:GOTO840 EL
SE840
810 IFB<10 AND PPOINT(X+5,Y-2)=3
THEN PUT(X,Y)-(X+11,Y+15),BL,PS
ET:Y=Y-40:PUT(X,Y)-(X+11,Y+15),S
T,PSET:GOTO840
820 IFB>53 AND PPOINT(X+5,Y+19)=
3THEN PUT(X,Y)-(X+11,Y+15),BL,PS
ET:Y=Y+40:PUT(X,Y)-(X+11,Y+15),S
T,PSET:GOTO840
830 IFB>53 THEN PUT(X,Y)-(X+11,Y
+15),BL,PSET:PUT(X,Y)-(X+11,Y+15
),DU,PSET:PO=3:GOTO 840
840 IFST<243ANDRND(17+INT(L*1.5)

```

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COMPI'NERVEID- 72317,437 (LEAVE PHONE #)

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```

)=1 THEN DRAW"BM"+STR$(X+12)+", "
+STR$(Y+15)+"C4NU6R2NU1ØR2U6":PL
AYM$(4):DRAW"C1D6L2NU1ØL2U6":ST=
ST+INT(7/S):FORT=2ØØTOST:DRAW"BM
"+STR$(T)+", 13NU4":NEXTT
85Ø IF S=4 ORS=9 THEN TI=TI-1:PS
ET(TI,24,1):IF TI<1 THEN TI=1
86Ø FOR T=1TO PN:IF(Y=PB(T)-15AN
D X=>PA(T)-3)AND(Y=PB(T)-15AND X
=<PA(T)+7)THEN 87Ø ELSE NEXTT:GO
TO89Ø
87Ø TR=TR+1:DRAW"BM"+STR$(PA(T))
+", "+STR$(PB(T))+"S2C1NR1ØH2NR14
H2NR18H2NR22U2NR22U2NR22U2NR22BE
2R18H2L14E2R1Ø":DRAW"BM"+STR$(PA
(T))+", "+STR$(PB(T)-2)+"S4C2U6BR
4D6R4U6NL4BR4D6R4U6L4":PLAYM$(1)
:PA(T)=Ø:PB(T)=Ø:SC=SC+1ØØ:DRAW"
C1R4D6L4U6L4NR4D6L4U6BL4D6"
88Ø GOSUB118Ø:GOTO7ØØ
89Ø IF Y+15=KB+6AND X=>KA-3AND Y
+15=KB+6 AND X<=KA+7THEN 9ØØELSE
91Ø
9ØØ KC=1:LINE(KA-2,KB)-(KA+12,KB
+6),PSET,BF:DRAW"C2BM"+STR$(KA
)+", "+STR$(KB)+"NR6F6NL6BR4U6R4D
6NL4":PLAYM$(1):DRAW"C1NR4U6L4D6
L4NL1ØH6R6":KA=Ø:KB=Ø:SC=SC+5ØØ:G
OSUB118Ø:DRAW"C2BM136,4R4D2G2H2N
U2F2D8NL2U2NL2":GOTO7ØØ
91Ø IFPPOINT(X+5,Y+19)=1 AND Y<1
6Ø THEN FORT=Y TO Y+4Ø STEP4:PUT
(X,Y-8)-(X+11,Y+7),BL,PSET:PUT(X
,Y)-(X+11,Y+15),ST,PSET:PLAY"T25
502C":NEXTY:PUT(X,Y-8)-(X+11,Y+7
),BL,PSET:Y=Y-4:PUT(X,Y)-(X+11,Y
+15),DU,PSET:FA=1:ST=ST-1Ø:GOTO9
1Ø
92Ø IF SC>3999 AND SC<4351 THEN
FG=1
93Ø A$=INKEY$:IF FG=1AND A$=" "T
HENPLAYM$(4):PLAYM$(1):FG=Ø ELSE
GOTO95Ø
94Ø FORT=1TO2Ø:SCREEN1,1:PLAY"L2
55T25503A":SCREEN1,Ø:NEXTT:RESTO
RE:FORT=1TO15:READLX,LY:NEXTT:S=
6:ST=25Ø:PCLS1:FORT=1TO2Ø:SCREEN
1,1:PLAY"A":SCREEN1,Ø:NEXTT:PLAY
"L4T4":GOTO24Ø
95Ø IFFA=1 ANDPPOINT(X+5,Y+19)<>
1THEN FA=Ø:PLAY M$(2):GOSUB122Ø:
GOTO7ØØ
96Ø IFPPOINT(X+5,Y+19)=1 AND Y>1
6Ø THEN ST=2ØØ:FORT=Y TO2ØØ STEP
4:PUT(X,T-4)-(X+11,T+11),BL,PSET
:PUT(X,T)-(X+11,T+15),ST,PSET:NE
XTT:PUT(X,T-4)-(X+11,T+11),BL,PS
ET:GOSUB122Ø:GOTO7ØØ
97Ø IFX=>LA ANDY=LB+1ANDX=<LA+11
ANDKC=1THENPLAYM$(4):SC=SC+35Ø:G
OSUB118Ø:DRAW"S4":S=S+1:FORAA=1T

```

```

05ØØ:NEXTAA:IFST<245THENST=ST+5:
GOTO24Ø ELSE24Ø
98Ø IF(S=6ANDX>195ANDX<2Ø1AND Y=
124) OR(S=7ANDX>233ANDX<246AND Y
=84) OR(S=8ANDX>195ANDX<2Ø1AND Y
=124)THEN 99Ø ELSE 1ØØØ
99Ø FORT=Y+15 TO Y STEP-2:PUT(X,
Y)-(X+11,T),ST,PSET:PUT(RA,RB)-
(RA+11,RB+15),ST,PSET:PUT(RA,RB
)-(RA+11,RB+15),ST,PSET:PLAY"L25
5T25502A":NEXTT:LINE(X,Y)-(X+11,
Y+15),PSET,BF:X=RA:Y=RB:PLAY"L
4T4"
1ØØØ IFS<>WR OR WW=ØTHEN 1Ø2Ø EL
SEIF RND(3)<>1 THEN 1Ø2Ø ELSE R=
RND(4):RR=RND(115)+5:IFR=1 THEN
RA=L1 ELSEIFR=2 THEN RA=L2 ELSEI
FR=3 THEN RA=L3 ELSEIF R=4 THENR
A=L4 ELSE1ØØØ
1Ø1Ø CIRCLE(RR,RA),5,1:PAINT(RR,
RA),1,1
1Ø2Ø IF S=WR AND WW=1 AND FF=Ø
THEN FF=1:PUT(218,WY)-(229,WY+15
),RL,PSET:COLOR2:LINE(231,WY)-(2
31,WY+15),PSET:FX=21Ø:FY=Y+9
1Ø3Ø IF S=WR AND FF=1 THEN PUT(F
X,FY)-(FX+11,FY+5),BL,PSET:FX=FX
-8:IF FX<=12 THEN FF=Ø ELSEPUT(F
X,FY)-(FX+11,FY+5),FB,PSET
1Ø4Ø IF S=WR AND FF=1 AND Y=FY-9
AND X>=FX-4 AND X+11<=FX+15 THE
N PLAY"T255L25501FGT4L4":ST=ST-1
2:GOSUB122Ø:PUT(FX,FY)-(FX+11,FY
+5),BL,PSET:FF=Ø
1Ø5Ø IF S=WR AND WW=1 AND RND(6)
=1 THEN ST=ST-RND(3):SCREEN1,1:P
LAY"05T255L255GL4T4":SCREEN1,Ø:G
OSUB122Ø
1Ø6Ø IFWW=1 AND S=WR THEN PUT(21
8,WY)-(229,WY+15),BL,PSET:LINE(2
16,WY)-(216,WY+15),PSET:LINE(2
31,WY)-(231,WY+15),PSET
1Ø7Ø IFWW=1 AND S=WR THEN PUT(21
8,Y)-(229,Y+15),ST,PSET:COLOR2:L
INE(216,Y)-(216,Y+15),PSET:WY=Y
1Ø8Ø IFS<>WR ORY<>164THEN1ØØØ EL
SEIFX>53 ANDX=<74 THEN1Ø9Ø ELSE
IFX>=3Ø ANDX<=45 THEN1Ø9Ø ELSE I
FX=>84 ANDX=<1ØØ THEN1Ø9Ø ELSE 1
1ØØ
1Ø9Ø ST=2ØØ:FORT=1TO15:PUT(X,Y)-
(X+11,Y+15),ST,PSET:PLAY"L255T
25504D":PUT(X,Y)-(X+11,Y+15),RL,
PSET:PLAY"E":PUT(X,Y)-(X+11,Y+
15),RR,PSET:PLAY"F":PUT(X,Y)-
(X+11,Y+15),BL,PSET:NEXTT:PLAY"T4
L4":GOSUB122Ø
11ØØ IFY=164 ANDWW=1 AND S=WR TH
EN 111Ø ELSE113Ø
111Ø FORT=1TO7:PUT(218,Y)-(229,Y
+15),BL,PSET:PUT(66,Y)-(77,Y+15)

```



```

,ST,PRESET:PUT(66,Y)-(77,Y+15),B
L,PSET:PLAY"L255T255O2A":NEXTT:P
LAY"L4T4":FORT=1TO15:PUT(66,Y)-(
77,Y+15),ST,PRESET:PUT(66,Y)-(77
,Y+15),RL,PRESET:PUT(66,Y)-(77,Y
+15),RR,PRESET
1120 PUT(66,Y)-(77,Y+15),BL,PSET
:PLAY"L255T255O4DEF":NEXTT:WW=0:
PLAY"L4T4":COLOR4:LINE(132,63)-(
195,61),PSET,B:LINE(132,103)-(19
5,101),PSET,B:LINE(132,143)-(195
,141),PSET,B:LINE(216,Y)-(216,Y+
15),PRESET
1130 TM=4100-S*85:IFTIMER>TM AND
WW=1 ANDS<>4 AND S<>9 THENGOSUB1
290
1140 IFBN=0THEN700 ELSEFOR T=1 T
OBN:IF X<BX(T)+13 AND X+13>BX(T)
AND PO<>3 AND Y=BY(T) THEN ST=S
T-5:PLAY"T255O4A":GOSUB1220:NEXT
T:GOTO1150 ELSE NEXTT:GOTO1150
1150 FORT=1TO BN:IFBD(T)=1THENBX
(T)=BX(T)+4:PUT(BX(T)-4,BY(T))-(
BX(T)+7,BY(T)+6),BL,PSET:GOTO116
0ELSE BX(T)=BX(T)-4:PUT(BX(T)+11
,BY(T))-(BX(T)+26,BY(T)+6),BL,PS
ET
1160 PUT(BX(T),BY(T))-(BX(T)+11,
BY(T)+6),BA,PSET:IFBD(T)=0 THEN1
170 ELSEIFPPOINT(BX(T)+13,BY(T)+
6)<>1 ORBX(T)>=242 THENBD(T)=0:P
UT(BX(T),BY(T))-(BX(T)+11,BY(T)+
6),BL,PSET:BX(T)=BX(T)+11:NEXTT:
GOTO700ELSENEXTT:GOTO700
1170 IF PPOINT(BX(T)-2,BY(T)+6)<
>1 OR BX(T)<=5 THEN BD(T)=1:PUT(
BX(T),BY(T))-(BX(T)+11,BY(T)+6),
BL,PSET:BX(T)=BX(T)+11:NEXTT:GOT
O700 ELSENEXTT:GOTO700
1180 SC$=STR$(SC):TT=LEN(SC$):CO
LOR3:LINE(70,3)-(130,17),PSET,BF
:DRAW"S8BM70,6C1":FORT=1TOTT:C$=
MID$(SC$,T,1)
1190 IFC$="0"THENDRAW"R4D4L4NU4B
E4BR2"ELSEIFC$="1"THENDRAW"BR2D4
BR4BU4"ELSEIFC$="2"THENDRAW"R4D2
L4D2R4BU4BR2"ELSEIFC$="3"THENDRA
W"R4D2NL2D2NL4BU4BR2"ELSEIFC$="4
"THENDRAW"D2R3NU2NRD2BR3BU4"ELSE
IFC$="5"THENDRAW"NR4D2R4D2NL4BU4
BR2"
1200 IFC$="6"THENDRAW"NR4D4R4U2N
L4BU2BR2"ELSEIFC$="7"THENDRAW"R4
G2D2BR4BU4"ELSEIFC$="8"THENDRAW"
R4D4L4U2NU2R4U2BR2"ELSEIFC$="9"TH
ENDRAW"R4D4NL4U2L4U2BR6"
1210 NEXTT:DRAW"S4":RETURN
1220 COLOR3:IFST<200 THEN ST=200
1230 LINE(250,2)-(ST,16),PSET,BF
:IF ST=200 THEN 1240 ELSE RETURN
1240 PUT(X,Y)-(X+11,Y+15),BL,PSE

```

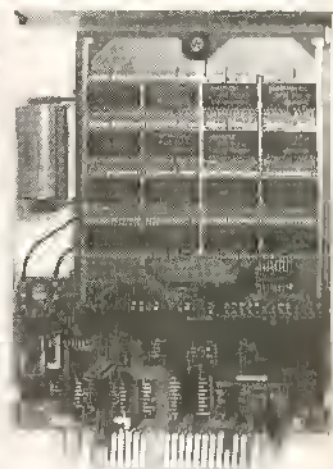
```

T:DRAW"C2BM"+STR$(X)+","+STR$(Y-
4)+"BR6D2NR2NL2D6R6NR2NU2ND2L12N
L2NU2ND2R6D10NL2NR2":PLAYM$(3)
1250 DRAW"S8BM75,30NR4D4R4U2L2BU
2BR4BR2G2D2U2R4NH2D2BR2U4F2E2D4B
R2NR4U2NR2U2R4BR6ND4R4D4NL4BR2BR
2H2NU2F2E2U2BR2NR4D2NR2D2R4BR2U4
R4D2L4R2F2":A$=INKEY$:IFA$=""THE
N1260 ELSESCREEN0,0:PMODEL1,1:PCL
S:RESTORE:GOTO230
1260 DRAW"S8C2BM53,70NR4D4U2R4U2
BR2NR4D4U2R4NU2L2F2BR2NR4U2NR2U2
R4BR2NR4D2R4D2NL4BR2R4U2L4U2R4BR
6BD2ND2NR4E2F2D2BR2U4F4U4BR2F2NE
2D2BR10U4D2R2NE2F2BR2NR4U2NR2U2R
4BR2F2NE2D2":A$=INKEY$:IFA$=""TH
EN1270ELSESCREEN0,0:PMODEL1,1:PCL
S:RESTORE:GOTO230
1270 DRAW"S8C2BM55,110R4L2D4BR4U
4R4D4NL4BR6U4R4D2NL4U2BR2D4R4BR2
BU4BD2ND2NR4E2F2D2BR4U2NH2E2BR6B
D2ND2NR4E2F2D2BR2R4U2NL2D2L4U4R4
BR2BD2ND2NR4E2F2D2BR2R4L2U4NL2R2
BR2ND4F4U4":A$=INKEY$:IFA$=""THE
NDRAW"C"+STR$(RND(3)+1):GOTO1250
1280 SCREEN0,0:PMODEL1,1:PCLS:RES
TORE:GOTO230
1290 ST=ST-2:GOSUB1220:PLAY"T255
L255O3GL4T4":RETURN

```

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Five optical illusions to display on
your CoCo3 monitor

**Now You See It,
Now You Don't!**

By Jean-Francois Morin

After reading an article about optical illusions, I decided to try to draw some examples of them on my computer. I first drew the CoCo 3 screen on a sheet of ruled paper, and then I traced the illusions on that "screen." After drawing the pictures, I built them into one program. I have written some explanations in the program to make some illusions easier to understand.

The first illusion is a paradoxical picture with three branches at the left end and two at the right end. Try to see where the middle branch disappears.

In the second illusion, there are 16 black squares on a large white square. Watch the picture carefully and you should see gray dots at the white intersections between the black squares.

The third illusion contains two identical circles that are surrounded by

smaller and larger circles. If you look carefully at the two center circles, the left one should appear smaller than the right one.

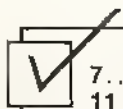
The fourth illusion is another paradoxical picture. It is a 3-D triangle that is impossible to build with wood or metal.

The last illusion is made of horizontal, vertical and diagonal lines that don't seem to be parallel at all, but they are!

For the "Press a key" that appears on each screen, I used the HPRINT command. The POKE 59078, 33 command disables the automatic HCLS with the HSCREEN command (POKE 59078, 141 to put it back). To copy 40-column text on the 640-by-192 screen, I used the POKE 59063, 33 and POKE 59063, 141 that appear in "Our Highfalutin' Feline Does a CoCo 3 Fandango" by H. Allen Curtis (May '87, Page 52).

Jean-Francois Morin is a 16-year-old beginning programmer who also enjoys swimming, reading books and biking. He uses his CoCo 3 for playing games, word processing, and making music and graphics.

(Questions or comments concerning this program may be addressed to the author at 16 Parc des Coriniers, Loretteville, Quebec, Canada G2A 3R7. Please enclose an SASE if requesting a reply.) □



```

7.....73 22.....176
11.....227 END.....158
18.....85

```

The listing: ILLUSION

```

Ø 'COPYRIGHT 1989  FALSOFT,INC
1 POKE65497,Ø:ONBRKGOTO3Ø:PALETT
EØ,Ø:PALETTE1,63:PALETTE2,Ø:PALE
TTE3,16:PALETTE4,32:PALETTE5,63:
POKE59Ø78,33
2 HSCREEN2:HCLS:HPRINT(15,1Ø),"I
llusions":HPRINT(9,13),"by Jean-
Francois Morin":FORI=ØTO64STEP8:
HLINE(I,I)-(32Ø-I,192-I),PSET,B:
NEXT
3 Z=1:FORI=4TO28STEP8:HPAINT(I,I
),I/4+Z,1:HPAINT(I+32,I+32),I/4+
Z,1:Z=Z-1:NEXT:FORI=ØTO64STEP8:H
LINE(I,I)-(32Ø-I,192-I),PRESET,B
:NEXT:HLINE(1Ø4,184)-(2Ø7,191),P

```

```

RESET,BF:HPRINT(14,23),"Press a
key
4 IFINKEY$=""THENP=RND(16)-1:GOS
UB28:GOTO4
5 HSCREENØ:WIDTH4Ø:PALETTE3,16:C
LS4:ATTR3,3:LOCATE8,6:PRINT"The
first illusion is a":LOCATE8,7:P
RINT"paradoxical picture. At":LO
CATE8,8:PRINT"the left end, ther
e are":LOCATE8,9:PRINT"three bra
nches, but one":LOCATE8,1Ø:PRINT
"disappears at the right
6 LOCATE8,11:PRINT"end.":GOSUB29
7 HSCREEN4:HCLS:FORI=1ØØTO1Ø1:FO
RJ=56TO57:HDRAW"BM=I;=J;R44ØM+2
Ø,+5ØM-1Ø,+15L45ØBU15NR46ØBU1ØR4
3ØNM-1Ø,-25L2ØM-6,-15NM+14,-1ØL4
Ø4BU1ØR42Ø":NEXTJ,I
8 FORI=63TO123STEP25:FORJ=1ØØTO1
Ø1:FORK=I TOI+1:HCIRCLE(J,K),15:
NEXTK,J,I:POKE59Ø63,33:HSCREEN2:
HPRINT(14,22),"Press a key":HSCR
EEN4:POKE59Ø63,141:EXEC44539
9 HSCREENØ:CLS:LOCATE7,6:PRINT"O
n the next illusion, the":LOCATE

```

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```

7,7:PRINT"intersections between
the":LOCATE7,8:PRINT"black squar
es seem to be":LOCATE7,9:PRINT"
grey, but they are only":LOCATE
E7,10:PRINT"in your mind!":GOSUB
29:HSCREEN4
10 HCLS:FORI=180TO479STEP80:FORJ
=20TO169STEP40:HLINE(I,J)-(I+73,
J+38),PSET,B:NEXTJ,I:HLINE(160,1
0)-(519,191),PSET,B:HPAINT(170,1
5):POKE59063,63:HSCREEN2:A$="Pre
ss a key":FORI=6TO16:HPRINT(5,I)
,MID$(A$,I-5,1):NEXT:HSCREEN4:PO
KE59063,141:EXEC44539
11 HSCREEN0:CLS:LOCATE9,6:PRINT"
On the third illusion,":LOCATE9,
7:PRINT"there are two identi-":
LOCATE9,8:PRINT"cal circles surr
ounded":LOCATE9,9:PRINT"by smal
ler and larger":LOCATE9,10:PRINT
"circles, but the left":LOCATE9
,11
12 PRINT"circle looks smaller"
:LOCATE9,12:PRINT"than the right
one.":GOSUB29
13 HSCREEN4:HCLS:FORI=1TO14:READ
A,B,C:HCIRCLE(A,B),C:HPAINT(A,B)
:NEXT:POKE59063,63:HSCREEN2:HPRI
NT(14,22),"Press a key":HSCREEN4
:POKE59063,141:EXEC44539
14 DATA200,96,13,200,66,25,140,8
1,25,140,111,25,200,126,25,260,1
11,25,260,81,25,460,96,13,460,81
,8,430,89,8,430,103,8,460,111,8,
490,103,8,490,89,8
15 HSCREEN0:CLS:LOCATE8,6:PRINT"
On the fourth illusion,":LOCATE8
,7:PRINT"you will see another
":LOCATE8,8:PRINT"paradoxical pi
cture. It":LOCATE8,9:PRINT"is a
3-D triangle that":LOCATE8,10
16 PRINT"appears easier to be
":LOCATE8,11:PRINT"drawn on a s
creen than":LOCATE8,12:PRINT"bei
ng built with solid":LOCATE8,13
:PRINT"wood!":GOSUB29
17 HSCREEN4:HCLS:HDRAW"BM32,152M
288,24R48M600,156M576,168L512M32
,152R48NM112,168R464NM568,140NM5
76,168M312,36NL48NM336,24M112,13
6NM80,152R352NM496,152M312,60NM3
36,48M160,136
18 PALETTE2,32:HPAINT(316,32),2,
1:HPAINT(288,40),2,1:HPAINT(96,1
50),2,1:HPAINT(336,32),3,1:HPAIN
T(568,150),3,1:HPAINT(320,48),3,

```

```

1:POKE59063,33:HSCREEN2:HPRINT(1
4,23),"Press a key":HSCREEN4:POK
E59063,141:EXEC44539
19 HSCREEN0:CLS:LOCATE8,6:PRINT"
On the last illusion,":LOCATE8
,7:PRINT"there are horizontal,
":LOCATE8,8:PRINT"vertical and
diagonal":LOCATE8,9:PRINT"lines
. They do not seem":LOCATE8,10:P
RINT"to be parallel at all":LO
CATE8,11
20 PRINT"but they are!":GOSUB29
21 HSCREEN4:HCLS:C$="M+16,-8":A$
="XC$;U16XC$;D16":B$="XC$;L32XC$
;R32":HDRAW"BM0,40XA$;XC$;U16R16
D8XC$;BM0,56XC$;D16XA$;XA$;XA$;X
C$;U8BM0,168":FORI=1TO9:HDRAWA$:
NEXT:HDRAW"XC$;U16R16D8XC$;BM0,1
84XC$;D16":FORI=1TO11:HDRAWA$:NE
XT:HDRAW"XC$;U8
22 HDRAW"BM176,191XC$;D8BR16U16X
C$;D16":FORI=1TO10:HDRAWA$:NEXT:
HDRAW"XC$;U16BR16D8XC$;BM256,191
U8XC$;D16":FORI=1TO11:HDRAWA$:NE
XT:HDRAW"XC$;BM432,191XC$;D8BR16
U16XC$;D16":FORI=1TO5:HDRAWA$:NE
XT:HDRAW"BM512,191U8XC$;D16XA$;X
A$;XA$;XC$;
23 HDRAW"BM0,96R16":FORI=1TO6:HD
RAWB$:NEXT:HDRAW"BM0,136XC$;L16U
8R32":FORI=1TO7:HDRAWB$:NEXT:HDR
AW"XC$;BM80,191":FORI=1TO12:Hdra
WB$:NEXT:HDRAW"BM112,191XC$;R32"
:FORI=1TO11:HDRAWB$:NEXT:HDRAW"X
C$;BM336,191
24 FORI=1TO10:HDRAWB$:NEXT:HDRAW
"BM368,191XC$;R32":FORI=1TO7:HDR
AWB$:NEXT:HDRAW"U8L16XC$;BM592,1
91XB$;XB$;BM624,191XC$;
25 FORI=1TO16:READA,B:HPAINT(A,B
):NEXT:DATA96,4,120,4,224,4,4,13
2,352,4,380,4,480,4,608,4,188,18
8,636,4,636,48,636,36,636,112,44
4,188,636,176,636,164
26 HLINE(160,184)-(480,191),PRES
ET,BF:POKE59063,33:HSCREEN2:HPRI
NT(11,23),"Press BREAK to end":H
SCREEN4:POKE59063,141
27 GOTO27
28 FORI=1TO500:NEXT:FORI=0TO3:PA
LETTEI+2,P+I*16:NEXT:RETURN
29 LOCATE13,22:ATTR3,3,B:PRINT"P
ress a key...":ATTR3,3:LOCATE39
,23:EXEC41329:RETURN
30 HSCREEN0:POKE65496,0:CLS:CMP:
PALETTE3,16:POKE59078,141

```


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Put a new twist in computer graphics

CoCo in 3-D!

By Eugene Vasconi

We're about to change the definition of 3-D graphics on the Color Computer. Sure, any old computer can create simulated solid geometric images on the screen, but ours can actually make shapes appear to move in front of the screen!

The 3-D process was devised by filmmakers in their search for new ways to create realism in films and also as an audience-attracting gimmick. Most of us have probably sat either in a theatre or at home with 3-D glasses on and seen things appear to jump out at us from the screen. The sensation is quite simple to explain. Your eyes are two to three inches apart, and each sees a slightly different image from the other. The brain combines these images and, depending on how close the object is to your eyes, determines distance. 3-D takes advantage of this difference in creating the illusion of depth in two-dimensional pictures.

The left lens in 3-D glasses is a red filter. When the eye behind this filter

sees something red, it emphasizes that object while putting less importance on other colors. The right, blue lens does the same thing with blue objects. (TV 3-D uses red and blue lenses, whereas theatre movies use red and green.) So we end up with colored images that, when combined in the brain, tend to put a depth perspective on the screen if done properly.

The 3-D processes on film and for the Color Computer are a bit different. Film tends to make colors melt into one another, while the computer makes them much more definite. This results in the need to make adjustments, and I've discovered some hints to use in creating your own pictures:

- Red objects appear in the background, while blue ones appear in the foreground.
- Green and white, universal to both eyes, aren't dimensional, but green is a good color to use to attract the eye to a certain part of the screen.
- Designs must be very bold and should have some movement.

This program is the result of my numerous experiments with 3-D. It is menu-driven and self-explanatory. When you load and run the program,

it will execute a PCLEAR 8 and give you a menu screen — I would suggest doing the test screen first to adjust your TV or monitor to the proper shades of color. Any automatic color controls will need to be switched off and the tint or hue control adjusted. Try to match the red and blue on the screen to the colors on a pair of 3-D glasses — too far off and you won't get the desired effect. Pressing M in any part of the program returns you to the menu.

One of the best examples of the program's use is to employ it in an adjustment of Norm Cutter's *Sinelines* program (October '83, Page 80). I've added both red and blue color to the line so that when it moves and turns, it creates various colored patterns. You'll also note a green line shown. This doesn't stay but is there to attract the eye to the main line. As the lines are drawn, you'll see the perspective shift as it seems to also move forward and backward.

Now find a pair of 3-D glasses — the show is about to start!

(Questions or comments concerning this program may be directed to the author at 12474 Starcrest 204, San Antonio, TX 78216. Please enclose an SASE when requesting a reply.) □

Eugene Vasconi is a helicopter pilot in San Antonio, Texas, as well as a musician and free-lance television producer. His major interests on the CoCo are graphics and music.

✓ 14	206	150	30
28	147	175	208
55	24	196	189
75	201	212	12
99	10	END	39
125	187		

The listing: 3DGRAPHX

```

Ø 'COPYRIGHT 1989  FALSOFT, INC
1 GOTO 224
2 W=Ø:CLS(3):PRINT@39,"*** 3-D M
ENU ***";
3 PLAY"V25"
4 FORSX=1TO2Ø:PLAY"V-O4L255T255C
E-G":NEXTSX
5 PLAY"V15"
6 PRINT@131,"1 - TEST SCREEN
   ";;PRINT@163,"2 - FOREGROU
ND CIRCLE   ";;PRINT@195,"3 - J
UMPING CIRCLE   ";;PRINT@227
,"4 - ATOM SMASHER   ";
7 PRINT@259,"5 - YELLING FACE
   ";;PRINT@291,"6 - STARBURS
T           ";;PRINT@323,"7 - D
IMENSIONAL SINELINES";:PRINT@355
,"8 - DO IT YOURSELF   ";
8 PRINT@417,">>PRESS NUMBER FOR
SELECTION<<";:PRINT@45Ø,"**RETUR
N TO MENU WITH [M]**";:PRINT@48Ø
,CHR$(143+32);
9 W$=INKEY$
1Ø W=VAL(W$)
11 IF W=>1 AND W=<8 THEN GOTO13
12 GOTO9
13 FORWN=1TO2Ø:CLS(7):PRINT@198,
"PUT ON 3-D GLASSES";:PRINT@3Ø1,
"now";:PLAY"T255L255O4FF#G":FORP
P=1TO1ØØ:NEXTPP
14 CLS(8):PLAY"O1DD#E":FORPP=1TO
5Ø:NEXTPP,WN
15 ON W GOTO16,28,5Ø,73,94,138,1
85,2Ø2
16 CLS(4):PRINT @38,"3-D- TEST S
CREEN";:PRINT@13Ø,"ADJUST THE FO
LLOWING SCREEN   TO MATCH THE
COLORS OF YOUR   3-D GLASSES.
THE RIGHT BLUE   SQUARE SHOULD
APPEAR TO BE IN   FRONT OF THE
RED BACKGROUND -- OPPOSITE ON T
HE LEFT SIDE."
17 PRINT@384,"PRESS ANY KEY WHEN
READY   >[M] RETURNS YOU T
O THE MENU"
18 '**TEST SCREEN**
19 PMODE3,1:PCLS(3)

```

```

2Ø COLOR5:LINE(125,Ø)-(125,196),
PSET
21 PAINT(2ØØ,1Ø),4,5
22 COLOR4:LINE(3Ø,5Ø)-(125,12Ø),
PSET,BF
23 COLOR3:LINE-(22Ø,5Ø),PSET,BF
24 EXEC44539
25 W$=INKEY$:IF W$="M" THEN GOTO
2
26 PMODE3,1:SCREEN1,1:GOTO25
27 '**CIRCLE & LINES**
28 PMODE3,1:PCLS(5):SCREEN1,1
29 FORX=1ØTO25ØSTEP5
3Ø COLOR3
31 LINE(125,1Ø)-(X,3Ø),PSET
32 COLOR4
33 LINE-(X,17Ø),PSET
34 COLOR3
35 LINE-(125,1Ø),PSET
36 NEXTX
37 CIRCLE(125,1ØØ),71,2
38 PLAY"O2L255T255CAFDFA"
39 CIRCLE(125,1ØØ),7Ø,2:PAINT(12
5,1ØØ),3,2
4Ø FORX=1TO6ØSTEP8:CIRCLE(125,1Ø
Ø),X,4:SOUND X,1:NEXTX
41 DRAW"BM7Ø,7Ø;S6C5;R25D15L1ØD5

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R1ØD15L25U7R1ØU4L6U13R6U4L1ØU7"
42 PAINT(75,75),4,5
43 DRAW"BM137,71;S5;R23F5D31G5L2
3U4ØBF9R8F2D23G2L8U26"
44 PAINT(142,72),4,5
45 DRAW"BM115,9Ø;S5;R9D5L9U5"
46 PAINT(117,92),4,5
47 PLAY"O5L255T255BB-AA-GG-FE"
48 W$=INKEY$:IF W$="M" THEN GOTO
2 ELSE48
49 '** JUMPING CIRCLE**
5Ø G=1Ø
51 FORP=1TO8STEP2
52 PMODEL,P:PCLS(4):SCREEN1,1
53 FORX=1TO115STEP5
54 SOUND X,1
55 Y=Y+1
56 COLOR(2+Y)
57 LINE(1Ø+X,1Ø+(X/1.4))-(24Ø-X,
18Ø-(X/1.4)),PSET,BF
58 COLOR5:LINE(1Ø+X,1Ø+(X/1.4))-
(24Ø-X,18Ø-(X/1.4)),PSET,B
59 IFY=>3THEN Y=Ø
6Ø NEXTX
61 COLOR5:LINE(Ø,Ø)-(255,195),PS
ET:LINE(255,Ø)-(Ø,195),PSET
62 CIRCLE(125,95),G,2:PAINT(125,
95),2,2
63 CIRCLE(125,95),G-1,4:PAINT(12
5,95),4,4
64 G=G+35
65 NEXTP
66 FORSH=1TO8STEP2
67 PMODEL,SH:SCREEN1,1
68 FORPZ=1TO95:NEXTPZ:PLAY"O5T25
5L255B-"
69 NEXTSH
7Ø W$=INKEY$:IF W$="M" THEN GOTO
2 ELSE71
71 GOTO66
72 '**ATOM SMASHER**
73 FORP=1TO8STEP2:PMODEL,P:PCLS(
4):NEXTP
74 PMODEL,1:SCREEN1,1
75 SOUND 1,1
76 COLOR2:LINE(255,Ø)-(Ø,195),PS
ET:LINE(Ø,Ø)-(255,195),PSET
77 FORS=1TO125
78 GOSUB88
79 CIRCLE(125,95),S,3
8Ø NEXTS
81 FORP=1TO8STEP2
82 PMODEL,P:SCREEN1,1
83 W$=INKEY$:IF W$="M" THEN GOTO
2
84 FORPP=1TO8Ø:NEXTPP:PLAY"O1L25
5T255CC#D"
85 NEXTP
86 PLAY"L255T255O5B"
87 GOTO81

```

```

88 S$="S"+STR$(S)+";"
89 IF S=2ØTHEN PMODEL,3:SCREEN1,
1:SOUND S,1
9Ø IF S=5ØTHEN PMODEL,5:SCREEN1,
1:SOUND S,1
91 IF S=8ØTHEN PMODEL,7:SCREEN1,
1:SOUND S,1
92 RETURN
93 '**YELLING FACE**
94 PMODEL:PCLS(2):SCREEN1,1
95 CIRCLE(195,7Ø),2Ø,4,1.3,.4,.3
96 CIRCLE(55,7Ø),2Ø,4,1.3,.1,.9
97 CIRCLE(125,85),8Ø,4
98 PAINT(125,85),4,4
99 CIRCLE(9Ø,5Ø),2Ø,3
1ØØ CIRCLE(16Ø,5Ø),2Ø,3
1Ø1 PAINT(9Ø,5Ø),3,3
1Ø2 PAINT(16Ø,6Ø),3,3
1Ø3 FORX=1TO7
1Ø4 CIRCLE(16Ø,6Ø),X,2
1Ø5 CIRCLE(9Ø,6Ø),X,2
1Ø6 NEXTX
1Ø7 DRAW"BM12Ø,8Ø;C3;S4;D1ØR15U1
Ø"
1Ø8 CIRCLE(127,95),15,3,.4
1Ø9 PAINT(127,95),3,3
11Ø CIRCLE(127,135),45,2,.4
111 PAINT(127,135),2,2
112 PAINT(1Ø,1Ø),5,4
113 PLAY"V1":FORSX=1TO3Ø:PLAY"L2
55T255O2V+FF#GG#":NEXTSX:PLAY"V1
5"
114 DRAW"BM127,135"
115 FORS=1TO2ØSTEP3
116 S$="S"+STR$(S)+";"
117 SOUND S,1
118 DRAW S$+"C3;BM-4,+1;L1ØU2R6U
2L6U4R6U2L6U2R1ØD6L2D1R2D5"
119 FORPP=1TO15Ø:NEXTPP
12Ø NEXTS
121 DRAW"BM127,135"
122 FORS=1TO2ØSTEP3
123 SOUND S+2Ø,1
124 S$="S"+STR$(S)+";"
125 DRAW S$+"C3;BM+2,+4;R8E2U8H2
L8D12BU4BR3U4R3D4L3"
126 FORPP=1TO15Ø:NEXTPP
127 NEXTS
128 DRAW"BM15,1ØØ;C5;R6D4L3D1R3D
5L6"
129 PAINT(16,1ØØ),3,3
13Ø DRAW"BM23Ø,115;C5;L6D6R6U6"
131 PAINT(23Ø,115),3,3
132 PLAY"O1"
133 FORSX=1TO4:PLAY"L255T255O+CC
#GG#B-BDD#AA#EF":NEXTSX
134 FOREY=4TO6STEP2:PAINT(9Ø,6Ø)
,EY,3:PAINT(16Ø,6Ø),EY,3
135 NEXTEY
136 W$=INKEY$:IF W$="M" THEN GOT

```



```

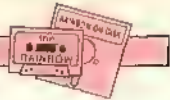
02 ELSE 134
137 '**STARBURST**
138 PMODEL,1:PCLS(3):SCREEN1,1
139 FORX=5TO11STEP2
140 QQ=X
141 IFX=>100THEN QQ=105
142 PSET(QQ+15,QQ,4)
143 PLAY"O5L255T255B"
144 PSET(X+12,X-5,3)
145 NEXTX
146 FORC=5TO3STEP-1
147 C$="C"+STR$(C)+";"
148 DRAW C$+"BM120,100;S4;NE40NF
40NG40NH40"
149 PLAY"O1L255T255CC#"
150 NEXTC
151 A=60:B=60:C=30:D=15:E=20:F=1
5
152 FORN=1TO12STEP2
153 X=C+E*SIN(N/A*3.14)
154 XX=X*5
155 M=N*3
156 GOSUB182
157 Y=D-F*Z
158 YY=Y*6
159 W$=INKEY$:IF W$="M" THEN GOT
O2
160 COLOR2:LINE(XX-30,YY)-(270-X
X,180-YY),PSET
161 COLOR4:LINE(XX-30,YY)-(270-X
X,180-YY),PSET
162 NEXTN
163 FORX=3TO108STEP3
164 CIRCLE(120,90),X,2
165 PLAY"L255T255O1EF"
166 CIRCLE(120,90),X-3,3
167 NEXTX
168 FORX=11TO3STEP-2
169 CIRCLE(120,90),X-2,4
170 CIRCLE(120,90),X,3
171 NEXTX
172 FORFC=1TO15
173 CIRCLE(120,90),FC,4
174 PLAY"L255T255O1E-D"
175 NEXTFC
176 FORFF=15TO1STEP-1
177 CIRCLE(120,90),FF,3
178 PLAY"L255T255O1CC#"
179 NEXTFF
180 W$=INKEY$:IF W$="M" THEN GOT
O2
181 GOTO138
182 Z=SIN((90-M)/57.296)
183 RETURN
184 '**DIMENSIONAL SINELINES**
185 PMODE3,1:PCLS(4):SCREEN1,1:P
LAY"O5V30":FOR SX=1TO4:PLAY"L100T
10-V<BGEC":NEXT SX:PLAY"V15"
186 PMODE3,1:PCLS(5):SCREEN1,1
187 B=0:S=0:D=0:Q=0:X=0:I=0
188 B=B+I

```

```

189 S=S+.1
190 D=D+Q
191 IF B>250 THEN PCLS:I=-2
192 IF D>180 THEN Q=-2
193 IF D<5 THEN Q=2
194 IF B<5 THEN I=2
195 X=(SIN(S)*129)+129
196 COLOR2:LINE(X,D+1)-(D,B+1),P
SET:COLOR3
197 LINE(X,D)-(D,B),PSET:COLOR4
198 LINE(X,D+1)-(D,B+1),PSET
199 W$=INKEY$:IF W$="M" THEN GOT
O2
200 GOTO188
201 '**DO IT YOURSELF**
202 CLS(7)
203 PRINT@37,"** DO IT YOURSELF
**";
204 PLAY"L4T204DCFL8GO5CO4L4AL8G
O5CO4L4AL3F"
205 PRINT@128," JOYSTICKS CONTRO
L THE ENDS OF THE DRAWING LINE
. > PRESS [B] FOR
BLUE LINE > [R] FOR
RED LINE > [G] FOR
GREEN LINE > [C] FOR
CIRCLES"
206 PRINT@320," > [CLEAR]
TO ERASE > [M] FOR
MAIN MENU"
207 PRINT@448," ** PRESS ANY KE
Y TO BEGIN **"
208 EXEC44539
209 PLAY"O1V15L6T2":FOR SX=1TO4:P
LAY"T>V+O+CFEDB-":NEXT SX:PLAY"V1
5L255T255"
210 PMODE3,1:PCLS(3):SCREEN1,1
211 CP=4
212 J=JOYSTK(0)*4:K=JOYSTK(1)*3
213 L=JOYSTK(2)*4:M=JOYSTK(3)*3
214 COLOR CP+1:LINE(J,K)-(L,M),P
SET
215 COLOR CP:LINE(J,K)-(L,M),PSE
T
216 CP$=INKEY$
217 IF CP$="R" THEN CP=4:PLAY"O5
B"
218 IF CP$="G" THEN CP=2:PLAY"O5
G"
219 IF CP$="B" THEN CP=3:PLAY"O5
F"
220 IF CP$="C" THEN PLAY"O5AB-B"
:CIRCLE(J,K),10,5:PAINT(J,K),CP,
5:CIRCLE(L,M),10,5:PAINT(L,M),CP
,5
221 IF CP$=CHR$(12) THEN PLAY"O5
C":GOTO210
222 IF CP$="M" THEN GOTO2
223 GOTO212
224 PCLEAR8:GOTO2

```



*Astound your non-computing friends
by making the CoCo a "know-it-all"*

The CoCo Quiz Master

By Bill Bernico

One of the things that most impresses non-computerists is a quiz-type program with answers evaluated by the computer. The computer lets you know if the answer you selected is right or wrong, and you get some sort of score at the end.

These folks are likely to ask, "How does the computer *know* which is the right answer?" Sounds silly now that I have a few years of hacking behind me, but it was the very question I asked before I ever laid hands on a computer.

Obviously, the computer doesn't know the answer. It's programmed to search the DATA statements to find the right answer that you've put there —

Bill Bernico is the author of over 200 Color Computer programs and is a frequent RAINBOW contributor whose hobbies include golf, writing music and programming. Bill is a drummer in a rock band and lives in Sheboygan, Wisconsin.

nothing more, nothing less. This program is a good example of that kind of technique.

I just happened to choose questions on computing for this quiz; if you have a certain category you'd rather build your quiz around, by all means feel free to change the DATA statements. It's that simple.

Each DATA statement is made up of five parts. The first piece of DATA tells the computer which of those answers is the right one. Look at Line 300 in the listing. The 4 at the end of the DATA statement tells the computer that the first answer is the correct one.

Using this technique, you can make up your own quiz. Just make sure you follow the flow as presented here.

(Questions or comments concerning this program may be directed to the author at 708 Michigan Avenue, Sheboygan, WI 53081. Please enclose an SASE when requesting a reply.) □

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- Set #4 Wild West and Checkers;
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- Set #6 Block and Computer;
- Set #7 Small: Roman, Italics, Cubes, etc;
- Set #8 Novelty fonts; NEW
- Set #9 Gallant and Spartan; NEW
- Set #10 Several Roman fonts;
- Set #11 Gothic and Script;
- Set #12 More Roman and Italic;
- Set #13 Several Courier fonts; NEW
- Set #14 Modern and Screen; NEW
- Set #15 Tektron and Prestige; NEW

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The listing: COCOQUIZ

```

0 'COPYRIGHT 1989  FALSOFT, INC
10 'COCOQUIZ
20 'FROM KROMICO SOFTWARE
30 'BY BILL BERNICO
40 '
50 DIMA$(20),B$(20),C$(20),D$(20)
,E$(20),B(20):FORA=1TO20:READA$
(A),B$(A),C$(A),D$(A),E$(A),B(A)
:NEXTA
60 C=C+1
70 IF C<21 THEN 90
80 C=0:GOTO 60
90 IF B(C)=20 THEN 110
100 CLS:PRINTA$(C):PRINTSTRING$(
32,191):PRINTTAB(9)"1.) ";B$(C):
PRINTTAB(9)"2.) ";C$(C):PRINTTAB
(9)"3.) ";D$(C):PRINTTAB(9)"4.)
"ES$(C):GOTO130
110 D=D+1:IF D=21 THEN 210
120 GOTO 60
130 PRINT:PRINTTAB(7):INPUT"SELE
CT 1-4)";E:PRINT
140 IF E<1 OR E>4 THEN 130
150 F=F+1
160 IF E=B(C) THEN G=1:B(C)=20:GO
TO180
170 G=0
180 IF G=1 THEN 200
190 PRINTSTRING$(32,175);:SOUND1
,2:PRINT"WRONG! WE'LL TRY THIS
ONE LATER";:PRINTSTRING$(32,175)
;:GOSUB 290:GOTO 60
200 PRINTSTRING$(32,159);:SOUND1
91,2:PRINT"RIGHT! THAT'S ONE MO
RE FOR YOU.";:PRINTSTRING$(32,15
9);:GOSUB 290:GOTO 60
210 IF F=20 THEN 230
220 CLS:PRINT"YOU MISSED";F-20;"
QUESTIONS":GOTO 240
230 CLS:PRINT"VERY GOOD...NO WRO
NG ANSWERS
240 PRINT@324,"CARE TO TRY AGAIN
(Y/N)
250 IN$=INKEY$:IFIN$=""THEN 250
260 IF IN$="Y"THEN RUN
270 IF IN$="N"THEN CLS:LIST-30
280 GOTO 250
290 PRINT@484,"HIT ANY KEY TO CO
NTINUE";:FORX=1507TO1531:POKEX,P
EEK(X)-64:NEXT:EXEC44539:RETURN
300 DATA RESERVES BYTES OF STRIN
G SPACE,CLS,CLEAR,CONT,OPEN,2
310 DATA CHECKS THE KEYBOARD AND
RETURNS THE KEY THAT WAS HIT (I
F ANY),RIGHT$,SCREEN,JOYSTK,INKE
Y$,4
320 DATA SETS THE COMPUTER'S POI
NTER BACKTO THE FIRST ITEM ON TH
E FIRST DATA LINE,RENUM,RESTORE

```

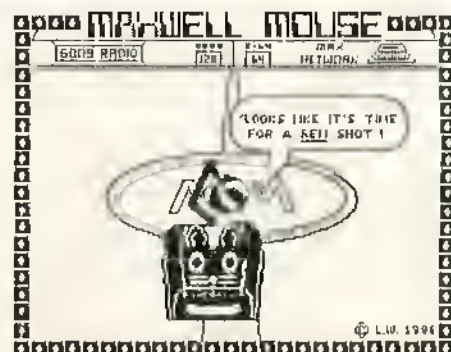
```

,TROFF,PPOINT,2
330 DATA PRINTS A STRING OF CHAR
ACTERS SPECIFIED BY ASCII CODE
,STR$,CHR$,STRING$,LEFT$,3
340 DATA RESETS A POINT TO THE B
ACKGROUND,COLOR,RESET,SET,PSET,PR
ESET,4
350 DATA STORES GRAPHICS FROM SO
URCE ONTOSTART/END RECTANGLE ON
A SCREEN,GET,PUT,SOUND,INT,2
360 DATA SETS FOREGROUND AND BAC
KGROUND COLOR,COLOR,CLS,PAINT,P
CLS,1
370 DATA DIMENSIONS ONE OR MORE
ARRAYS,DATA,DIM,GOSUB,LIST,2
380 DATA REPLACES A PORTION OF A
N OLD STRING WITH A NEW STRIN
G,LEFT$,RIGHT$,MID$,INKEY$,3
390 DATA ERASES EVERYTHING IN ME
MORY,CLS,PCLS,NEW,CLEAR,3
400 DATA SELECTS RESOLUTION AND
FIRST MEMORY PAGE,PCLEAR,PMOD
E,PCLS,PRESET,2
410 DATA PRINTS NUMBERS IN A SPE
CIFIED FORMAT,PRINT,PUT,READ,P
RINT USING,4
420 DATA LETS YOU INSERT COMMENT
S IN A PROGRAM LINE,REM,LIST,D
EL,SAVE,1
430 DATA RETURNS THE LENGTH OF A
STRING,STRING$,LEN,STR$,PEEK,2
440 DATA RETURNS RIGHT PORTION O
F ANY STRING,RIGHT$,LEFT$,STR
$,STRING$,1
450 DATA COMMAND USED TO CALL SP
ECIFIED SUBROUTINES,GOTO,GOSUB,
GET,LIST,2
460 DATA LOADS MACHINE LANGUAGE
PROGRAM FROM DISK,LOADM,CLOADM,
LOAD,CLOAD,1
470 DATA JUMPS TO SPECIFIED LINE
NUMBER,GOSUB,GET,GOTO,LLIST,3
480 DATA LISTS PROGRAM LINES TO
PRINTER,LIST,PRINT,INPUT,LLIST,4
490 DATA SELECTS EITHER GRAPHICS
OR TEXT DISPLAY AND THE COLOR S
ET,SCREEN,PCLS,PPOINT,PMODE,1

```

Maxwell Mouse

By Logan Ward





Saving your CoCo for a rainy day...



The Storm

By B.J. Bryson

Wrapped in warm cozy covers, a child watches the pouring rain from a second-story bedroom window, jumping every time the lightning flashes in the midnight sky and shivering with delight when the thunder rumbles in the distance. A childhood moment seized my thoughts as I took pencil in hand and put the image to paper.

But something was missing — the pitter-patter of raindrops on the windowpane, the flashes of lightning, the distant rumbling of thunder. It occurred to me that my CoCo might be able to help.

So I drew a child's face on a sheet of graph paper and filled in the squares outlining the area of my drawing. Then I cranked up the computer and set it to do graphics with Line 10. Next, I wrote the DRAW and PAINT instructions in Line 20, using the outlines on the graph paper as a guide in creating the DRAW instructions. I followed this procedure with the hair, clothes, cover and window, producing lines 30 to 180.

After the window came the lightning. I

concentrated on the bright flash lightning creates. Drawing and erasing the highlights of lightning flashes would have taken too long, so I decided to make a separate drawing of the highlighted scene and use page-flipping for lightning. With this plan in mind, I moved to graphics pages 5 to 8 and copied the picture to the new area with Line 190.



Going back to the original drawing, I added highlights with an orange pencil, copied these to the appropriate areas of the graph paper copy with the same pencil, and filled in the squares, outlining only the orange areas. I then wrote the DRAW and PAINT instructions in lines 200 to 290, using the new outlines as a guide in creating those instructions for drawing.

When finished with the highlights, I went back to the unhighlighted picture with Line 300, tossed in some thunder and

lightning using Line 310, and kept everything going with Line 1000.

At this point, the program could do its thing. But something seemed to be missing. Suddenly, it struck me like a bolt. There was no rain!

At first, I tried randomly plotting dots in the windowpane area, but it looked more like snow than rain. Since I couldn't think of any other way to simulate rain falling fast enough to look realistic, I decided to try raindrops trickling down the window. I began by randomly choosing a set of coordinates in Line 320. Line 330 saves the chosen coordinate values in variables H and V and moves the vertical coordinate down a few spaces. If the coordinates aren't in the windowpane area, Line 340 randomly assigns new values that are within the confines of this area. Finally, lines 350 to 370 reset the pixels pointed to by the H and V variables, set the pixels pointed to by the new coordinate values, and make a soft pitter-patter sound.

And there it is! I hope you enjoy this program as much as I enjoyed writing it. Please feel free to change and add to the program as the inspiration directs you. Most of all, have fun!

(Questions or comments concerning this article may be addressed to the author at P.O. Box 295, Manahawkin, NJ 08050. Please include an SASE when requesting a reply.)

B.J. Bryson has been working with computers since 1982. He enjoys creating music, graphics and animation on the Color Computer and hopes to find a computer game publishing company looking for a talented programmer.

✓ 50	108	240	55
110	242	300	75
190	108	END	123

The Listing: STORM

```

1 ' STORM
2 ' COPYRIGHT 1989  FALSOFT, INC
3 ' BY B. J. BRYSON
4 ' P. O. BOX 295
5 ' MANAHAWKIN, NJ 08050
10 PCLEAR8:PMODE4,1:PCLS:SCREEN1
,1
20 DRAW"BM82,91;R3ERUHERULHUNR5H
E2R4UEU2HE2UHU2HU3HU6E2RE2U2L5H2
UGL3GNL3GRFGL2GFDNGF2G2FDF2D3FD4
GDGD2GD2GDFD2GDFD":PAINT(83,90):
DRAW"BM90,75;C0L2BH2NDEUC1BR8BUH
U7GND2E2ND8HE2L2":'FACE
30 DRAW"BM102,74;HUEU4HU11EU2HL2
U2H4GFDLUHLUHGULHUHGDGD5FL3GL7G
DLGLG4D5FDLHGDFD2F2D2HGFDFGH3LHGF
D5LH2U2H2ND5U3HU6EF2EHU3FRFEH2EF
2EHU3HU4RER5FEH2UHR2FEH2R5F3EHU2
EUEUR2FEHURFRFEH2R2F5RFRF7D4GD8G
DFD11RU7DFD6RU5":PAINT(82,40):'
HAIR
40 DRAW"BM68,191;ULU2LU2NFLU3LUH

```

```

2UHU4HU5R2ER3FR3FR3FEH2L2HLURERE
REREHLGLGL4HU2EUE4UE3UE9RERE6REU
EUEU2EU4HU4HU3HU2HU4H2U2HUHU2EFD
FDFEUHU2RF2DF8L2HLGFRFRFR2F2RF4R
F3RF5DFDFDF3D12GD3GD3GD2GDGDG3DG
10DG6DG4LG9BM65,183;RF3RFRFRFRF2
DBL8UH":'RIGHT COVER
50 DRAW"BM74,157;E4U2RU2RUR2URUR
2UR2URUR2URURURURUR2UR2EUR3ENRGL
3GL4DL2DL2DL2FL2FL3FL3FNRL2FNRL
3FNRLDL2FLG2D2LD3L":PAINT(80,191
):'RIGHT COVER FOLD
60 DRAW"BM0,188;E3UE2U2EUEUE2UE3
UDFD8GD3GDGDG4":PAINT(0,191):'
LEFT COVER BACK
70 DRAW"BM42,191;U2HU2HUHU2HUHU3
HUH2UH2U4F6RFEH2LH3U2ERE2U3H2R3F
R2F2D2FD5GD6GD4GD4FD2FDFD2":PAIN
T(43,191):'LEFT COVER BOTTOM
80 DRAW"BM36,155;U2R2E2U4HUHUHUH
2UHU2HUHU3EUEU2ENU2FDFDFDF5RFR2F
RFR2FRFRFR2FRF3D2L2H3GF2D2GL7HGF
2RFD2GL7HL9":PAINT(45,150):'
LEFT COVER TOP
90 DRAW"BM71,141;L2ULHLGDNFLHEUH
LG2H2UHL2UHL3EUHNLU2H2NLG2U2R3NE
DFRER2FNRDGDGFRE2NUF2RR2FRNFLGDF2
RER2NEFNDHLG2D2":PAINT(65,137):D
RAW"H5C0LURURDBL4DLULURBL3LBU2LE
HDHDBH2UC1U":'LEFT PJ BOTTOM
100 DRAW"BM73,134;LULUHUH2LHNLEU
HLG2HLHLH2GU2L3GHL2EHGU2NLD2R3EF
RFRF2R3NU2R2ENHR2NU2FGDFR2D2NR2D
2":'LEFT PJ MIDDLE
110 DRAW"BM67,120;U5EU3G2LNH2LG2
LHU2NRFLHLD4FDR2ER2ND2R2F2D":PAI
NT(65,116):DRAW"U6C0LFL2FLBLLC1L
C0LEL2E2":'LEFT PJ TOP
120 DRAW"BM66,109;C1LHLHL2U3ER2E
R2ER4GDGDGDGHLG":PAINT(66,106):'
LEFT COLAR
130 DRAW"BM72,104;RFNDL3FBD4ND5F
ND13ED17FNU10FNU5FDU4FD2EDRFBG2L
DRDRD4FU6ED5":'BUTTONS
140 DRAW"BM75,102;ER2E2UER2F2RF2
DFGFLHGFLHGLHUNR2H2LH":PAINT(81,
102):DRAW"BM74,99;R4UEU3L3GDGD2"
:PAINT(75,97):'RIGHT COLLAR AND
THROAT
150 DRAW"BM75,104;RDR3DFR2D2FRE2
FRE2UD4GD2GDL2GDFR2E3URD5LG2D2R3
NUL3D2LUHLGH2LU2LHLR2EUHL2GUR2EU
HL2UE2ULEUHU2":PAINT(80,111):'
RIGHT PJ TOP
160 DRAW"BM77,120F4DL2NU3FDLFR5D
R2GD2L3NFUHUHU":'RIGHT PJ BOTTOM
170 DRAW"BM84,121;C0R2DL2BR4UBU2
RBU7BL2LFL2FLBL2DBD2DL2ELBU2LEL2
URBE2RDLBH2LEL2ELBEBURC1D":'LEFT
TOP PJ DESIGN
180 DRAW"BM164,17;M164,101;M223,

```

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See Review 'Rainbow' 2/89

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```

131;U3M165,101;M223,130;UM165,10
1;M165,17;M221,0;L12M164,17;M212
,0;R3M165,17;M218,0; BM151,116;M
151,0RM152,116;LM255,186;BM230,1
91;M127,112;R3M149,118;R2":PAINT
(245,191):'WINDOW
190 PCOPY1TO5:PCOPY2TO6:PCOPY3TO
7:PCOPY4TO8:PMODE4,5:SCREEN1,1
200 DRAW"BM41,191;U7LND7LND7U3LN
D4U2LND5LUND6LU2ND5HND2LU2LUHUHU
2BR7BU3L4BL3BD3HU2EU2EU5HUHLHUHU
3HU5HU9EU3EUE3U2HLHU2EUE5URURURU
RURURURUF2L2FL2DGDGLG4DFEUD6FD5":
PAINT(33,155):'LEFT COVER
210 DRAW"BM52,191;U6HUHU2HU5EU4E
U6HUHUHLHL4HLUR6FR4FR4FRFRE2UH4L
HLHNR5NR6DNR6FNR6FR2U6H2NR7FNR7
FNR7RFNR5FNR4FNR2U6LH":PAINT(50,
191):PAINT(56,155):' LEFT COVER
INSIDE
220 DRAW"BM74,191;L3ELULULBD3BL2
HUHU2LULEL2EL2EUGNU6LU12D3GD4R17
U8HHHL2HNL2UBU2L3NR5ERHR6U3E2UEU
5REU2R2EUR2URURERE2RE3R3ER3ER BM
116,191;UEUE4UE2EUE2UEHU2E3UEE4U
E2UEU3EU2EU6HU4HUHUHUH2UH2":PAIN
T(110,191):'RIGHT BLANKET BOTTOM
230 DRAW"BM61,108;L2HGNL2U2L3DLH
ELHUE3RER6F2R2":PAINT(59,104):DR
AW"BU2R5DR2UNRHL10HU3EUEERERFR2FR
FR2FR2":PAINT(65,95):DRAW"BM95,1
03;HUHULULH3LHUE2UE2F2DFDBR2EHUH
2DFDF":PAINT(89,93):'COLAR, NECK
AND RIGHT BLANKET TOP
240 DRAW"BM88,84;D2GD2GDGL7HLHLH
LHU2HU2HU3EU2EUEU5EUE2R6HUL2BU5R
L2ERDBE2BU2R2L3HR2ER3HR5HRU2LNU2
RF2NL2DNL2DNL2FNL2BR3ED5LR2NU3BD
2DLDBD3BL4D2FD3FD2FDU3RNU8LD3GDL
3GD2NL5BG2G3":PAINT(75,84):'
FACE
250 DRAW"BM104,74;GDGUL2DLULUR4H
L2URU2RU4LND4U5LU2FU7RU2GULU2LUH
3D3NRGULU2":'RIGHT HAIR
260 DRAW"BM62,78;LULH2LD2RD3RD3H
GNU6U4LNU3GNU13HNU25UHNU20U3HNU1
4U4LU9FE3NUND2NF3R3U2LNU2DR2F2RF
EHL2NHR2U3LU2NU4LU6REND3RND3RD2N
R4ER3UH2UNR3FR3FH2UHR2DR4F3RU6RU
3F2R3H2U3LFNDF3RU3L":'HAIR
270 DRAW"BM58,138;LBH2LBH2LHLDHN
L2U4FDG2U2NLUNL4NRURE NL3UNL4HLE
UR2FDR2GR4DRL12D2L2HULUR3U2 BRL4
ND3LU4R3NGUHL2ND2REF2R2DRFNR2GL7
U4R2NR3NU3RU3RNU2R3D2R2NR2ULU4NL
3NU2RDR3UUH2LR4GNR4FR3GLFNR3FL4D
RDR2NUFRDRNU2FNU2R2":'LEFT PJ
280 DRAW"BM69,141;DRU2R2NU6RND2N
U3RU3BR12BU2ENU3RNU6EHUERFU2FNR2
UNR2HL2NDR3UER4LND2HL2U5RND6ED3R
2DHU5HNULNGNLHNLURU4FL2BL2LBU4R2U

```

```

3HND4UH2":'RIGHT PJ
290 DRAW"BM223,129;M223,0; BM149
,118;M136,112;L3M149,118;M132,11
2;L2M149,118;":PAINT(215,100):'
WINDOW
300 PMODE4,1:SCREEN1,1:' SHOW
UNHIGHLIGHTED PICTURE
310 IFRND(100)=1THENFORT=1TO9+RN
D(9):PMODE4,1+((RND(2)-1)*4):SCR
EEN1,1:NEXTT:PMODE4,1:SCREEN1,1:
PLAY"01T255L255V31CDGFEV25BGDCV1
0AFEBV15GEDBACV5EDBF":' THUNDER
AND LIGHTNING
320 R=RND(10):'CHOOSE COORDINATE
330 H=H(R):V=V(R):V(R)=V(R)+S(R)
:'SAVE COORDINATE VALUES AND MOVE
VERTICAL COORDINATE DOWN
340 IF V(R)>27+H(R)/2.25 OR H(R)
<165 THEN H(R)=165+RND(51):V(R)=
22+RND(90)-(H(R)-80)/8:S(R)=RND(
3):'CHOOSE NEW COORDINATE VALUES
IF COORDINATES AREN'T IN WINDOW
350 PRESET(H,V):PRESET(H+1,V):'
ERASE OLD VALUES
360 PSET(H(R),V(R),1):PSET(H(R)+
1,V(R),1):'PLOT NEW VALUES
370 IFRND(10)>3THENPOKE140,250+R
ND(5):EXEC43350:' PITTER-PATTER
SOUND
1000 GOTO310:' GO BACK TO THUNDE
RAND LIGHTNING ROUTINE

```

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Auto-run BASIC programs by typing just their filenames

EZRun

By Fred Kolesar

Wouldn't it be nice if BASIC programs would load into CoCo's memory and run just by typing its filename. No more typing RUN then fumbling for that *&!% shift quote (if I had a nickel for every time I've missed the shift key and typed run2 filename). EZRun makes several changes to the CoCo including a patch to load and auto run BASIC programs with just a filename. Table 1 gives a brief explanation of what EZRun does.

To use EZRun on a 64K CoCo just put a REM at the start of each line marked "CoCo 3 Only" and be sure the CoCo 2 is in the all-RAM mode before running EZRun.

I've included a fully commented EDTASM source code (Listing 1) for the auto-run module. The source file is a conditional assembly. Setting the expression on Line 600 to 0 or 1 will assemble the object code for either Disk BASIC 1.0 or 1.1 respectively. Beginners, don't use the /SR switch if you assemble this file. EZRun is a multiple ORG program and cannot be assembled as a single record.

Fred Kolesar is the owner of a small business in Westfield, Pennsylvania. After buying his first computer in 1984, he quickly became addicted to programming. He and his wife, Cindy, have two daughters, Kristina and Nichole, ages seven and six, who are now programming his old CoCo 2.

At the expense of only five bytes I've made it PC relative. EZRun will function properly anywhere in memory as long as the hook at \$AF90 points to the new location. Memory address \$AF90 is a JSR instruction with the next two bytes being a hexadecimal address pointing to EZRun.

When you press ENTER after typing at the keyboard, BASIC must interpret and execute what you have typed. BASIC attempts to match what you have typed with its list of reserved words. If it can't find a match, BASIC assumes you are assigning a variable name and jumps to its LET routine. LET grabs the variable name then looks for an = token (for example, TEST1). When BASIC checks for the equal sign and it's not there it returns a Syntax Error message. This is where EZRun steps in.

EZRun performs the syntax check and returns control to BASIC if the equal

Table 1	
Lines	Description
12	Contains the Read/Data PALETTE command. Data can be any color number 0 to 63. The first eight numbers are background palettes 0 to 7 and the second eight are foreground palettes 0 to 7. A single space separates the foreground and background color numbers. The space is for quick editing of the 16 palettes. While in the Edit mode press S (search sub-command) then the space bar; the edit cursor jumps to the center of the 16 palettes. To change a background palette count backward from 7. For foreground palettes count forward from 0. If you're not using a CoCo 3 put a REM at the start of Line 12. In this way, should you upgrade to a CoCo 3, you'll need only delete the REM to use the CoCo 3 line. Do the same with all "CoCo 3 Only" lines.
22	Contains the printer baud rate. Change the value after the comma to suit your system. CoCo's standard baud rate is 600 (POKE 150,87). Baud 1200 is 150, 40; 1800
24	Contains the disk-drive step rate. If you get I/O errors when trying to load at this rate, press the Reset button and put a REM at the start of Line 24.
26	Cuts the disk access delay in half. Try it, if it doesn't work for you, do as in Line 24.
28	Enhances the OK prompt. Address 2394 holds the default drive number. Poking 44014 with this value +48 changes the 0 to the default drive number. Poking 44015,62 changes the K to the Greater Than symbol >.
34 to 44	Patch the DRIVE command so that it will update the prompt whenever it's used. For example, type DRIVE 2, then press ENTER and the prompt changes to '2>'.



sign is present. Otherwise *EZRun* assumes you have typed a filename and attempts to load and run the program.

Because Color BASIC's LET routine only preserves the first two characters of a viable name, *EZRun* has to temporarily patch Disk BASIC's filename routine. Lines 2600 to 4400 make a patch that brings Disk BASIC back to the subroutine GETLEN, lines 5300 to 8000. GETLEN removes the hook in Disk BASIC and converts any operator tokens that Color BASIC may have put into the input buffer. The Subroutine then returns to Disk BASIC with the input buffer location in Register X and the filename length in Register B. After Disk BASIC has finished processing a valid filename, control returns to lines 4500 to 4900, which send control to CoCo's load and run routines.

Note: Lines 2000 to 2200 will abort

Listing 1:

```

AUTO RUN PATCH ** 12/88                                EDTASM+/p1.p.p.p.p    PAGE 1

                                ggggg ***      Copyright (C) 1988
                                ggggg ***      Kolesar B/S
                                ggggg ***      7 Ladd Road
                                ggggg ***      Westfield, pa. 1695g
                                ggggg
                                ggggg DEFLAG      TITLE      AUTO RUN PATCH ** 12/88
                                ggggg EQU 1      * Conditional assembly flag
                                                g = 1.g dos / 1 = 1.1 dos

                                ggggg DB1g      EQU 1
                                ggggg DB11      EQU g
                                ggggg STORE      EQU $76      * 2 unused bytes in low ram

AF9g                                g11gg ***      org hook where LET statement does syntax check
AF9g BD  FAAg                        g12gg      ORG      $AF9g
                                g13gg HOOK      JSR      FNCK      * new syntax check for LET
                                g14gg
                                g15gg ***      org new syntax check in ram above Super E.C.B.
FAAg                                g16gg      ORG      $FAAg
FAAg EL  9F gga6                    g17gg FNCK      CMFB      [gA6]      * do syntax ck for "="
FAA4 26  g2                        g18gg      BNE      MAYBE      * not "=" could be filename
FAA6 gE  9F                        g19gg      JHP      $9F      * "=", process new variable
FAA8 D6  68                        g20gg MAYBE      LDB      $68      * msb of line#/$FF=direct mode
FAAA 5C                                g21gg      INCB      * $FF+1 is g
FAAB 26  4B                        g22gg      BNE      ERROR      * not g! can't be direct mode
FAAD 86  g3                        g23gg      LDA      #3      * direct mode, do RUN"Filename
FAAF B7  g959                      g24gg      STA      $959      * run flag, 3=close files/run
FAB2 F7  g95E                      g25gg      STB      $95E      * merge flag, g=no merge
                                g26gg      COND      DB1g-DBFLAG
                                g27gg      LDB      $C8A2      * D-Basic 1.g jsr address
                                g28gg      ENDC
                                g29gg      COND      DB11-DBFLAG
FAB5 FC  C95g                      g30gg      LDD      $C95g      * D-Basic 1.1 jsr address
                                g31gg      ENDC
FAB8 DD  76                        g32gg      STD      STORE      * save it for later
FABA 1F  5g                        g33gg      TFR      PC,D      * our ram location into D
FABC C3  gggf                      g34gg      ADDD      #GETLEN-OS1      * offset to Getlen sub
                                g35gg      COND      DB1g-DBFLAG
                                g36gg      STD      $C8A2      * hook it in D-Basic 1.g
                                g37gg      LDX      #$C28E      * point X at 'BAS' ext
                                g38gg      JSR      $C88A      * let D-Basic 1.g process f/n
                                g39gg      ENDC
                                g40gg      COND      DB11-DBFLAG
FABF FD  C95g                      g41gg      STD      $C95g      * hook lt in D-basic 1.1
FAC2 8E  C2A6                      g42gg      LDX      #$C2A6      * point X at 'BAS' ext
FAC5 BD  C93B                      g43gg      JSR      $C938      * let D-Basic 1.1 process f/n
                                g44gg      ENDC
                                g45gg      COND      DB1g-DBFLAG
                                g46gg      JMP      $C9BE      * let D-basic 1.g load/run f/n
                                g47gg      ENDC
                                g48gg      COND      DB11-DBFLAG
FAC8 7E  CA6C                      g49gg      JMP      $CA6C      * let D-basic 1.1 load/run f/n
                                g50gg      ENDC
                                g51gg ***      D-Basic will JSR back to here while processing
                                g52gg ***      D-basic's f/n routine checks for a valid
                                                variable. Upon exit X= location;B= length
FACB DC  76                        g53gg GETLEN      LDD      STORE      * D-basic normal jsr address
                                g54gg      COND      DB1g-DBFLAG
                                g55gg      STD      $C8A2      * remove my hook in 1.g
                                g56gg      ENDC
                                g57gg      COND      DB11-DBFLAG
FACD FD  C95g                      g58gg      STD      $C95g      * remove my hook in 1.1
                                g59gg      ENDC
                                g60gg      LDU      #$2DC      * input buffer, f/n is here
FADg CE  g2DC                      g61gg      PSHS      U      * save f/n start
FAD3 34  4g                        g62gg      CLRB      * now get length in B
FAD5 5F                                g63gg      * & strip any operator tokens

```

Lines Description

Type DRIVE 0 then press ENTER. Now the prompt is '0>'.
 48 Lets you enter PCLEAR 0 through 8 within a program or direct mode.

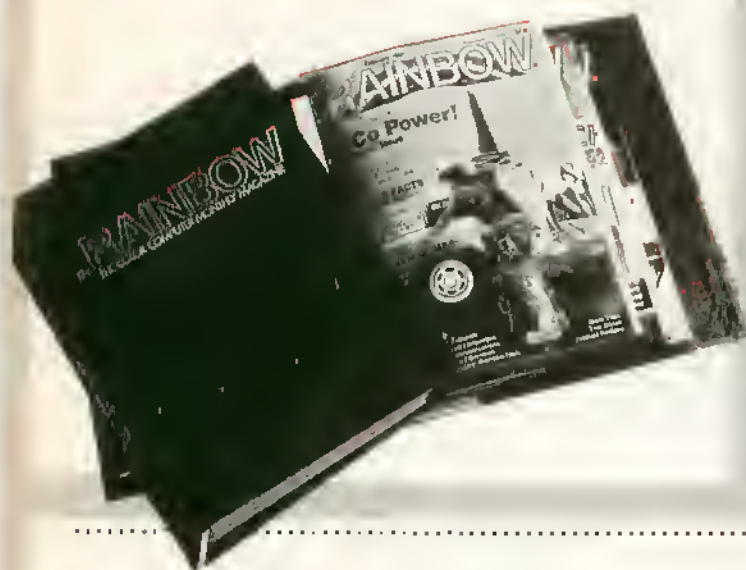
52 Replaces the awkward SHIFT-@ combo that puts CoCo on hold. Pressing BREAK alone does the job of holding the CoCo, and SHIFT-BREAK will function as the BREAK key.

54 Makes SHIFT-space bar function as SHIFT-Up arrow. I use the EDIT command a lot while programming in BASIC and the space bar is a lot handier than the arrow.

60 to 76 Poke the *EZRun* object code into memory and patch the LET statement. This allows you to load and run a BASIC program just by typing its filename. LOAD and RUN work as before.

90 to 95 Error check data lines 66 to 70. This must be done separately from the actual poke routine in Line 76. Assigning a new variable while making the patch will lock up the computer.

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FAD6 A6	C8	06400	COUNT	LDA	,U+	* get a byte from the input
FAD8 27	1B	06500		BEQ	FKEND	* 0 byte is end of buffer
FADA 5C		06600		INCB		* not end. add 1 to count
FADB 85	88	06700		BITA	#128	* test bit 7
FADD 27	F7	06800		BEQ	COUNT	* clr! not a token
FADF 1F	51	06900		TFR	PC,X	* where are we in ram?
FAE1 30	89 001A	07000	OS2	LEAX	TABLE-OS2,X	* X has Table address
FAE5 A1	81	07100	T1	CMPL	,X++	* match token side of table?
FAE7 27	06	07200		BEQ	T2	* yes.
FAE9 6D	84	07300		TST	,X	* end of table?
FAEB 26	F8	07400		BNE	T1	* no. keep looking
FAED 20	09	07500		BRA	ERROR	* not in the table
FAEF A6	82	07600	T2	LDA	,X	* X-1. byte from ascii side
FAF1 A7	5F	07700		STA	-1,U	* replace token in buffer
FAF3 20	E1	07800		BRA	COUNT	* keep checking input buffer
FAF5 35	10	07900	FNEND	FULS	X	* f/n start in X for D-basic
FAF7 39		08000		RTS		* let D-basic cont. f/n ck
FAF8 7E	B277	08100	ERROR	JMP	\$B277	* syntax error
		08200	***			1st byte of each double byte is token
						value of the operator. 2nd byte is the
						ascii value
FAFB	8327	08300	TABLE	FDB	\$8327	* *
FAFD	AB28	08400		FDB	\$AB28	* +
FAFF	AC2D	08500		FDB	\$AC2D	* -
FB01	AE2F	08600		FDB	\$AE2F	* /
FB03	AF5E	08700		FDB	\$AF5E	* ^
FB05	AD2A	08800		FDB	\$AD2A	* *
FB07	B23E	08900		FDB	\$B23E	* >
FB09	B43C	09000		FDB	\$B43C	* <
FB0B	00	09100		FCB	0	* end of table flag
	0000	09200		END		

00000 TOTAL ERRORS

EZRun if reached from within a running BASIC program line.

EZRun is limited to filenames that do not begin with a reserved word. The filename POKER won't work. BASIC matches the reserved word POKE and changes it to a single byte token (146). While executing the input, BASIC jumps to the POKE routine instead of LET. Of course you can't POKE R so a Syntax Error is returned from the POKE routine.

This can be handled in two ways. You can use the old methods of typing RUN "POKER"/LOAD "POKER",R or rename problem files with the prefix X, for example, XPOKER. Since CoCo doesn't have any reserved words beginning with X this will force the interpreter to execute the LET routine and allow EZRun to step in.

I hope these enhancements make CoCoing as user friendly for you as they have me.

(Questions or comments regarding this utility may be directed to the author at 7 Ladd Road, Westfield, PA 16950. Please enclose an SASE when requesting a reply.)

Listing 2: EZRUN

```

0 *** Copyright (C) 1988
1 'COPYRIGHT 1989 FALSOFT, INC
2 '*** Kolesar B/S
4 '*** 7 Ladd Road
6 '*** Westfield, PA. 16950
8 GOSUB90:RESTORE ' go check dat
a. return if ok!
10 '* read/data palette command
(COCO 3 ONLY)
12 FORF=0TO15:READC:PALETTEF,C:N
EXT:DATA18,0,9,36,38,27,45,38,0
,18,0,63,54,0,36,27
14 WIDTH 80:CLS2 ' (COCO 3 ONLY)
16 ATTR 3,1 ' (COCO 3 ONLY)
18 VERIFY ON
20 IFPEEK(49474)><48THENDB=1:' d
isk basic 1.1 if ><48
22 POKE 150,40 'set printer baud
at 1200
24 IFDB=1THEN POKE55318,20:POKE5
5232,0 ELSEPOKE55075,20:POKE5498
9,0 'set 6ms step rate
26 IFDB=1THEN POKE55180,18:POKE5
5181,18:POKE55182,18 ELSEPOKE549
37,18:POKE54938,18:POKE54939,18
'nop second delay loop
28 POKE 44014,PEEK(2394)+48 :POK
E 44015,62 ' new prompt 0
30 POKE 44016,32 ' replace carri
age return after new prompt
32 '* patch DRIVE command
34 IFDB=1THEN POKE52942,126:POKE

```

```

52943,0:POKE52944,243 ELSEPOKE52
722,126:POKE52723,0:POKE52724,24
3 'jmp 243
36 POKE 243,247 :POKE 244,9 :POK
E 245,90 ' stb 2394
38 POKE 246,203 :POKE247,48 ' ad
db #48
40 POKE 248,247 :POKE249,171 :PO
KE 250,238 ' stb 44014
42 POKE 251,192 :POKE 252,48 ' s
ubb #48
44 POKE 253,57 ' rts
46 '* patch PCLEAR command
48 POKE 38543,33 :POKE 38563,33
'pclear0 brn f/c error
50 '
52 POKE 41598,19 ' change <BREAK
> to equal <SH>-<@>
54 POKE41591,95 ' change <SHF>-<
SPACEBAR> to equal <SHF>-<^>
56 '* patch LET for Autorun enha
ncement
58 '* to relocate patch change l
ine 60. variable 'A' is the sta
rt location of the patch, 'B' is
start+length of the patch. ('A
=&HFAA0' to 'A=&H new address').
Also match data in line 74 to
the new address
60 A=&HFAA0:B=A+&H6B:GOSUB76
62 IFDB><1THENPOKEA+22,200:POKEA
+23,162:POKEA+32,200:POKEA+33,16
2:POKEA+36,142:POKEA+38,200:POKE

```

```

A+39,138:POKEA+41,201:POKEA+42,1
90:POKEA+46,200:POKEA+47,162:' p
atch Autorun for 1.0 D-basic
64 A=&HAF90:B=A+&H02:GOSUB76:END
66 DATA E1,9F,00,A6,26,02,0E,9F,
D6,68,5C,26,4B,86,03,B7,09,
59,F7,09,5E,FC,C9,50,DD,76,
1F,50,C3,00,0F,FD,C9,50,8E,
C2
68 DATA A6,BD,C9,38,7E,CA,6C,DC,
76,FD,C9,50,CE,02,DC,34,40,
5F,A6,C0,27,1B,5C,85,80,27,
F7,1F,51,30,89,00,1A,A1,81,
27
70 DATA 06,6D,84,26,F8,20,09,A6,
82,A7,5F,20,E1,35,10,39,7E,
B2,77,83,27,AB,2B,AC,2D,AE,
2F,AF,5E,AD,2A,B2,3E,B4,3C,
00
72 '* line 74 is M/L for JSR $
FAA0

```

```

74 DATA BD,FA,A0
76 FORF=A TO B:READH$:POKEF,VAL(
"&H"+H$):NEXT:RETURN
89 '* error check data lines
90 FORF=0TO15:READA:NEXT ' read
data past the palette settings (
COCO 3 ONLY)
91 B=36:C=4117:L=66:GOSUB95 '
data check line 66
92 C=4274:L=68:GOSUB95 '
data check line 68
93 C=3724:L=70: ' data check l
ine 70
94 '* Fall to line 95. Return to
line 8 if data is ok. Error mes
sage if not.
95 E=0:FORF=1TOB:READH$:E=E+VAL(
"&H"+H$):NEXT:IFE><C THENPRINT"D
ATA ERROR IN LINE"L:END ELSE RET
URN

```

Corrections

"Doctor ASCII" (February 1989, Page 99): The address given for Merle Kemmerly, author of *Telstar 3.2*, is an old one. His current address is:

Merle Kemmerly
150 S. Atlanta St., Apt. 24S
Roswell, GA 30075

"High Capacity Screen Dumps, Part I" (May 1989, Page 100): We have been informed of several corrections and clarifications for this article by H. Allen Curtis. They are as follows:

- 1) Page 101, Column 2, first full sentence: Change the name DESKTOPH to DESKTOPL.
- 2) Page 101, Column 2, third full paragraph: Change the phrase "if you have made" to "including."
- 3) Page 101, Column 3, third full paragraph: You must precede the insert indicated in the last sentence with a comma in Line 740 of the program. In other words, insert .CHR\$(27):CHR\$(15).
- 4) Page 103, Column 2, third full paragraph: Change the phrase "there's no need to" to "you must now."
- 5) Page 103, Column 3, second full paragraph: Replace the second and third sentences with:

Save the second screen as previously, but this time use the filename DUMPL2. Repeat the process used to obtain the second file and save the third screen as DUMPL3.

"CoCo Does Windows and a Whole Lot More" (March 1989, Page 100): There is a minor bug in the demo program (*Tic-Tac-Toe*) that causes it to think a move has been made if you open a window over the game and then click to close the window. To correct this, change lines 690, 760, 880 and 980 to:

```
GOSUB 13000:GX=-1:GY=-1:GOTO 560
```

"A Patch for a Patch" (February 1989, Page 80): As published, the patches to *Super Patched EDTASM* to allow the use of the CoCo 3's Hi-Res screens work only with Disk BASIC 1.0. Users of Disk BASIC 1.1 will appreciate the following correc-

tions. If you are starting from scratch and have the source code from the September 1983 issue, make the changes to those lines shown in the following table:

Line	DOS 1.0	DOS 1.1
149	\$CEA2	\$CF7E
172	\$CF07	\$CFE3
258	\$CA3B	\$CAE9
298	\$C8A4	\$C952
321	\$C468	\$C48D
392	\$CBD2	\$CCAC

Alternatively, if you want to use the SPATCH program included on the February 1989 RAINBOW ON DISK, follow the steps below:

- 1) Insert *EDTASM* ROM Pak and turn on the CoCo.
- 2) At the prompt, press Z and ENTER.
- 3) Type U C000 1000 27FF and press ENTER.
- 4) Put a fresh tape in the cassette recorder, press Play and Record.
- 5) Type P EDTASM 1000 37FF 1000 and press ENTER.
- 6) Turn the CoCo off, plug in the disk controller and power machine back up.
- 7) Copy SPATCH (from the February 1989 RAINBOW ON DISK) to a fresh disk.
- 8) Enter CLOADM"EDTASM" and save it to disk using: SAVEM "EDTASM",&H1000,&H37FF,&H1000.
- 9) Enter and run the following program:

```

0 PCLEAR8:WIDTH32:GOTO10
1'*****COPYRIGHT 1988 RANDALL R
EID
5 SAVE"DOSPATCH":END
10 LOADM"EDTASM":LOADM"SPATCH"
20 FORA=DT05:READ A$,B$,C$:POKE
VAL("&H"+A$),VAL("H"+B$):POKE V
AL("&H"+A$)+1,VAL("&H"+C$):NEXT
30 DATA 16CD,CF,7E,1654,CF,E3,0E
30,CA,E9,0E7E,C9,52,0EB1,C4,8D,0
F55,CC,AC
40 SAVEM"ED+/BIN",&H0E00,&H37FF,
&H0E00
50 END

```


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Support of Multiple Image Buffers in 512K mode	X			X
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*The twelfth in a series of tutorials
for the beginner to intermediate
machine language programmer*

Machine Language Made BASIC

Part XII: And the Music Played On

By William P. Nee

This month we'll use many of the machine language routines discussed in previous articles to create a music program that plays six voices (notes) simultaneously, and lets you change the timbre of the notes to create different sounds. First, let's decide what to put in the program and how to do it. Trying to make this as much like the PLAY command as possible, I suggest using the following values:

Note (C - B) with a sharp (#) or flat (-)

Octave (1 - 5)

Tempo (1 - 5)

Length: 1 = whole note (\$80)

2 = half note (\$40)

3 = quarter note triplet (\$15)

4 = quarter note (\$20)

5 = thirty-second note (\$4)

6 = sixteenth note (\$8)

7 = eighth note triplet (\$A)

8 = eighth note (\$10)

*9 = sixty-fourth note (\$2)

Rest

*Use for separating like notes or playing grace notes.

Since there are no graphics for this program, start it very low in memory to give plenty of room for each chord. Set Location \$FF/100 to \$E00 and ORG at \$2000. Reserve one memory byte for a note counter (NOTECT RMB 1) and load it with #6, since there are six notes in each chord. Reserve one memory byte each for Tempo, Length, Octave and temporary Octave 1. Chord information is put in as FCC lines. Once you set the Octave, Tempo and Length,

you do not need to re-enter them unless they change.

Label the start of the notes as NTABLE, remembering that using FCC lines enters the character's ASCII number (A = #41, I = #31, etc.). (EDTASM+ only allows 250 characters per FCC line.) You can also number the NTABLE(s) for easy reference or corrections at each stanza, movement, page, etc.

The vocabulary check pauses or "reads" each chord. First, load Register X with the

location of the NTABLE (LDX #NTABLE). Register X will now always contain the current chord location in the NTABLE. Load Stack U with the location \$4100, where the numerical value of each note is stored and saved. Load Register A with the contents of Register X (get the first character in the note chord) and increase Register X by one (LDA ,X+).

Is the first character an R? If not, go to the next check. If it is a Rest, load Register

The Listing: 6VOICES

```

0000 0000 * $FF/100=$E00
0001 0000 ORG $2000
0002 0000 START LDU #4100 START OF FIRST CHORD
0003 0000 LDX #NTABLE
0004 0000 LDB #6 SIX NOTES TO THE CHORD
0005 0000 STB NOTECT
0006 0000 LDA ,X+ GET THE FIRST CHARACTER
0007 0000 LBEQ PLAYER IF IT'S ZERO THATS ALL
0008 0000 CMPA #' ;
0009 0000 BEQ VOC PASS OVER A " ; "
0010 0000 CMPA #' R IS IT A REST
0011 0000 BNE TEMP
0012 0000 LDD TEMPO GET THE TEMPO AND LENGTH
0013 0000 STD ,U++ THEY START EACH CHORD
0014 0000 LDD #0 FILL IN SIX ZERO NOTES
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The New OWL-Ware Floppy Drive System

No Better System is Available at Any Price (But the Price is Great, too!)

WINDOW WRITER NOW AVAILABLE! (Described in February Rainbow)

DISK CONTROLLER

We at OWL-WARE are pleased to announce that we have purchased the rights to all of the Color Computer Products of J&M Systems. J&M has had more experience with CoCo controllers than any other supplier (except for Radio Shack® itself) and we are proud to add them to our nest! OWL-WARE will now be producing J&M controllers under the OWL brand. These controllers all use J&M's proven designs, with some minor improvements, and they will serve you for years to come.

- All gold contacts
- Works with all CoCo models (1,2,3)
- Holds 2 switchable ROMS
- Positive switching by simple jumper or optional external switch (No erratic software or pokes required)
- Buffered I/O lines to help prevent burn-out if unit accidentally pulled out with the system on
- Latching chips are socketed to speed repairs
- Does not use the WD1773 chip which caused problems with many CoCo 3 systems and is now discontinued
- Attractive all metal case
- Dealer inquiries now invited

CONTROLLER only \$69.
(without ROMs)

(Add \$14.95 for RSDOS
\$19.95 RSDOS and
OWLDOS)

See the next 2 pages for more
drive and software specials
from OWL-WARE



Disk drives are not our only business, but they sure are our main business! We have been selling hard and floppy drives for the CoCo longer than any other Rainbow advertiser. Our double sided drives are brand new, half-heights with a full one year warranty! The full-height drives offered cheap by our competition are *used or surplus!*

QUICK FLASH!! Announcing the Most Advanced Color Computer 3 Word Processor Ever!

WINDOW WRITER

Window Writer is the first word processor which takes full advantage of OS/9. The result is a word processor which is as modern and professional in action as those previously available only for the IBM and Mac. Allows multi-tasking with other programs or itself. Pull-down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. Can be user configured for everything including menu colors and contents. See the February Rainbow for preview of the early version. Requires 80 column monitor.

Available now at a special introductory price of:

\$49. until May 15. Normal price **\$59.**

(Ask about combo with spelling checker available for \$20)

CASE AND POWER SUPPLY

In recent months it has become very difficult to obtain dependable, safe power supply and cases for floppy drive systems. They just couldn't pass our quality control. OWL-WARE has now produced a case and power supply that you can be proud to own and use. We believe that this is the best and most attractive drive case available for any computer.

- Built in surge protector! (we believe that this feature is unique in CoCo drive cases)
- Sleek, modern design
- Heavy-duty power supply
- Fully shielded data cable
- Modular power supply construction for ease of repairs
- Stackable case design
- Dealer inquiries now invited

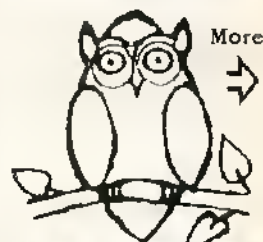
SPECIAL WINTER SALE

Double Sided Drives

Drive 0 System

Complete **\$199.**

Drive 1



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Proven

On the Razor's Edge of

Basic and OS-9 Hard Drive Systems

Proven Performance for Demanding Home or Business Users

Every hard drive which has been produced by OWL-WARE during the last 3 years is **complete**. A system consists of software, hard drive, controller, heavy-duty power supply, and LR Tech Interface. There are no hidden costs for assembly or testing. When a drive system is ordered, we fully **assemble, test, and burn-in** the system for 3 full days. This ensures dependability and optimum performance.

We have now been supplying CoCo hard drive systems and parts for more than 3 years. This is the longest history in the CoCo market of any system. Some other advertisers are stating that they have one of the most reliable systems for the CoCo with all of 4 months history in the CoCo hard drive market! We have reached our position in the hard drive market by providing our customers with a quality product that they (and we) can be proud to own and use.

Because of many requests for a lower price system in kit form, we are now selling a kit of all parts at a significant discount compared to our regular prices. We recommend this kit (or any kits offered by any other supplier) only to those who have experience in electronic assembly and OS-9.

We have LR Tech and Burke & Burke

**For OS-9
Levels 1
and 2**



10 Meg. 20 Meg. 40 Meg. 80 Meg.

(2 X 40 Meg.)

System Prices: (Includes Hard Drive, Controller, LR Tech Interface, Software. Fully assembled and tested.)

\$469. \$599. \$725. \$1,069.

Kit Prices: (LR Tech System as above but not assembled or tested.)

\$419. \$549. \$659. \$ 999.

Kit Prices: (As above but using Burke & Burke bus adapter)

(na) \$489. \$609. (lower prices)

30 Meg Kit: \$539. (Lowest prices anywhere)

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly, testing, and 3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 3 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and the B&B system. We believe that we have the best BASIC interface for CoCo hard drives available.*

BASIC Hard Drive Systems*

Feature	OWL	B&B
Drive Portion Available at One Time	Entire	Partial (4 sections)
User Sets BASIC/OS-9 Partitions	YES	Yes
Add to Existing OS-9 Drive Without Reformat	YES	No(?)
Drives 0-3 Hard/Floppy	YES	No
Built in Park	YES	No
Speed*	FAST	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but both systems are fast and we sell both. On ours all BASIC commands work including DSKINI, DSKIS, and DSKO\$.

Prices: With/Without Hard Drive

\$35./\$79.

Technology

the Color Computer Frontier

DISK DRIVES

Bonus!
Special
Bundled
Software
with any
Disk Drive
Purchase!



Floppy Drive Systems

The Highest Quality for Years of Service

(We have located a number of unused, surplus single sided drives for those who wish a quality, inexpensive system.)

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **\$199.** (Same but Single sided) **\$185**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **\$129.** (Same but Single sided) **\$115.**

New 3.5", 720K Drives for OS-9 with case & Power Supply \$179.

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) **\$295.**

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model \$119. Model \$129.

500

501 or 502

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL Phones

Order Numbers (only)

1-800-245-6228

1-215-682-6855

Technical Help

1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than \$20 each.

If sold separately this is more than \$125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only \$27.95

(or even better)

only \$6.95 with

any Disk Drive Purchase!!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE

P.O. BOX 116

Meritztown, PA 19539

D with the current tempo, store it at Location U, and increase U by two. Then clear Register D, store it at Location U, and increase U by two. Do this five more times to get the six notes, and return to the vocabulary check. If the character is not T, go to the next vocabulary check; if it is, read the next character, which must be a number. Since it is in ASCII, subtract #30 to get the actual number value; multiply this by 20 (just to get tempo changes) and store the result in TEMPO. Go back to the vocabulary check; if the character is not L, go to the next check; if it is, read the next character, which must be a number. Again, subtract #30 to get the number value.

The actual note lengths are stored in LTABLE, so if you load Register Y with the LTABLE location and Register B with the A value in the table (LDB A,Y), Register B will then contain the actual note length. Go back to the vocabulary check; if the next character is not an O, go to the next check. If it is, read the next character, which must be a number. Subtract #30 to get the number value (1 to 5) and store it in OCTAVE. Go back to the vocabulary check.

If the character isn't any of the above, it must be a note (C, D, E, F, G, A, B). First, increase the note location by two. Notes are always bytes 3 to 14, in our chord; the first two bytes are the tempo and length. Because there are 12 steps in an octave, convert a C to Note 1, D to Note 3, etc. The notes are in ASCII format so subtract #41 to get a number value (A will = 0, B will = 1, etc.).

CTABLE gives the note number assigned to each letter (A is the 10th note, B is the 11th note, G is the 8th note, etc.). Load Register Y with the CTABLE location and load Register B with the A value (LDB A,Y) to get the actual note value (C=1, D=3, E=5, F=6, G=8, A=10 and B=12). Now, check the next character to see if it is a sharp (#) or flat (-); if it's a sharp, increase the note value by one (C#=2, F#=7, etc.); if it's a flat, decrease the note value by one (E=-4, B=-11, etc.). Don't use C- or B# as they will blow the program.

If the next character after the note is not a sharp or a flat, decrease the vocabulary location by one, back to it's previous location. Now convert the note to a value the computer can use to play it. First, decrease the note numbers one to 12 by one, to get numbers from zero to 11, then load the current OCTAVE into a temporary OCT1. Multiply the note number (zero to 11) by two.

The location SCALE contains the frequency for each note (zero to 11). Each frequency is two bytes - that's why we multiplied the note number by two. If we load Register Y with the scale location and

2948 E6 A6	00440	LDB	A,Y	GET THE LENGTH VALUE
294D F7 2463	00450	STB	LENGTH	
2950 20 89	00460	SRA	VOC	
2952 81 4F	00470 OCT	CMFA	#'0	IS IT OCTAVE
2954 26 09	00480	SNE	NOTE	
2956 A6 80	00490	LDA	,X+	
2958 80 30	00500	SUBA	#30	GET THE OCTAVE NUMBER
295A B7 245F	00510	STA	OCTAVE	
295D 20 AC	00520	BRA	VOC	
295F 33 42	00530 NOTE	LEAU	2,U	INCREASE CHORD LOCATION BY TWO
2961 80 41	00540	SUBA	#341	GET THE LETTER COUNT
2963 108E 2440	00550	LDY	#CTABLE	
2967 E6 A6	00560	LDB	A,Y	GET THE LETTER VALUE
2969 A6 80	00570	LDA	,X+	CHECK FOR SHARP OR FLAT
296B 81 23	00580 GSHARP	CMFA	#'0	IS IT A SHARP
296D 26 03	00590	BNE	CFLAT	
296F 5C	00600	INCB		INCREASE THE NOTE VALUE BY ONE
2970 20 09	00610	BRA	STORE	
2972 81 2D	00620 CFLAT	CMFA	#'-	IS IT A FLAT
2974 26 03	00630	BNE	CDEC	
2976 5A	00640	DECB		DECREASE THE NOTE VALUE BY ONE
2977 20 02	00650	BRA	STORE	
2979 30 1F	00660 CDEC	LEAX	-1,X	IT WASN'T EITHER; DECREASE THE
LOCATION				
297B 5A	00670	STORE	DECB	GET NOTE VALUE 0 - 11
297C 86 245F	00680	LDA	OCTAVE	
297E 87 2460	00690	STA	OCT1	TEMPORARY OCTAVE
2982 86 02	00700	LDA	#2	
2984 3D	00710	MUL		
2985 108E 2447	00720	LDY	#SCALE	
2989 EC A5	00730	LDD	B,Y	NOTE FREQUENCY FOR OCTAVE 0
298B 7A 2460	00740	DEC	OCT1	
298E 27 04	00750	BEQ	SAVE	OK IF IT'S OCTAVE 0
2990 58	00760	ASLB		IF NOT, DOUBLE THE FREQUENCY
2991 49	00770	ROLA		
2992 20 F7	00780	BRA	ROTATE	NOW IS OCTAVE 0
2994 ED C4	00790	SAVE	STD	STORE THE 2-BYTE FREQUENCY
2996 7A 2461	00800	DEC	NOTECT	ONE LESS NOTE TO GET
2999 27 18	00810	BEQ	LOOP	CHORD'S GOT ALL SIX NOTES
299B A6 80	00820	LDA	,X+	
299D 81 3B	00830	CMFA	#';	
299F 27 06	00840	BEQ	FINISH	NO MORE NOTES IN THIS CHORD
29A1 81 4F	00850	CMFA	#'0	OCTAVE CHANCE?
29A3 27 AD	00860	BEQ	OCT	
29A5 20 B8	00870	BRA	NOTE	MUST BE ANOTHER NOTE
29A7 CC 0000	00880	FINISH	LDD	#0
29AA 33 42	00890 CFIN	LEAU	2,U	FILL IN THE CHORD WITH ZEROS
29AC ED C4	00900	STD	,U	
29AE 7A 2461	00910	DEC	NOTECT	
29B1 26 F7	00920	SNE	CFIN	ALL DONE?
29B3 FC 2462	00930	LDD	TEMPO	GET THE TEMPO AND LENGTH
29B6 ED 54	00940	STD	-12,U	PUT THEM AT START OF CHORD
29B8 33 42	00950	LEAU	2,U	START OF NEXT CHORD
29BA 16 FF49	00960	LBRA	CHORD	
29BD 20	00970	TITLE	FCC	/ * CHINESE SERENADE *
BY HERMAN FLIEGE/				
210F 0D00	00980	FDB	\$0000	
2111 54	00990	NTABLE	FCC	/T51804D03A02F#F#F#;04DC03ADG02A;04DC0
3A02DD;04DC03ADG02A/				
214B 4F	01000	FCC		/04D03B-G02CGG;04G03D028-;04D03B-G02DD
;04D03B-G02B-;/				
2180 4F	01010	FCC		/04DC03AF#F#F#;04A03D02A;04DC03A02D;04
DC03ADG02A;/				
21B1 4F	01020	FCC		/04D03B-G02C;04B-03D02B-;04D03B-G02D;04
D03B-G02B-;/				
21E3 4F	01030	FCC		/04DC03A02F#F#F#;04DC03ADG02A;04DC03A02
DDD;04DC03ADG02A/				
2219 4F	01040	FCC		/04D03B-G02GGG;04G03D02B-;04D03B-G02DDD
;04D03B-G02B-;/				
224E 4F	01050	FCC		/04DC03A02F#F#F#;05D04D03D02A;05D04D02
D;04F#DC03D02A;/				
2284 4F	01060	FCC		/04D03B-D02B-C;R;L405C04C02C01C;/
22A4 4C	01070	FCC		/L804DC03A02F#F#F#;04DC03ADG02A;04DC03A
02DD;04DC03ADG02A/				
22DC 4F	01080	FCC		/04D03B-G02CGG;04G03D02B-;04D03B-G02DD
;04D03B-G02B-;/				
2311 4F	01090	FCC		/04DC03AF#F#F#;04A03D02A;04DC03A02D;04
DC03ADG02A;/				
2342 4F	01100	FCC		/04D03B-G02C;04B-03D02B-;04D03B-G02D;04
D03B-G02B-;/				
2374 4F	01110	FCC		/04DC03A02F#F#F#;04DC03ADG02A;04DC03A02
DDD;04DC03ADG02A/				
23AA 4F	01120	FCC		/04D03B-G02CGG;04G03D02B-;04D03B-G02DDD
;04D03B-G02B-;/				


```

23DF 4F 01130 FCC /04DC03A02F#F#;05D04D03DC02A;05D04D02
D;04F#DC03DC02A;/
2415 4F 01140 FCC /04GD03B-D02B-C;R;L405G04G02C01C;/
2435 00 01150 FCC 0 END OF THE MUSIC
2436 0080 01160 LTABLE FDB $0080 NOTE LENGTHS
2438 4015 01170 FDB $4015
243A 2004 01180 FDB $2004
243C 080A 01190 FDB $080A
243E 1002 01200 FDB $1002
2440 0A0C 01210 GTABLE FDB $0A0C NUMBER VALUES FOR NOTE LETTERS
2442 0103 01220 FDB $0103
2444 0506 01230 FDB $0506
2446 08 01240 FCB $08
2447 02B6 01250 SCALE FDB $02B6 NOTE FREQUENCIES
2449 02DF 01260 FDB $02DF
244B 030B 01270 FDB $030B
244D 0339 01280 FDB $0339
244F 036A 01290 FDB $036A
2451 039E 01300 FDB $039E
2453 03D6 01310 FDB $03D6
2455 0410 01320 FDB $0410
2457 044E 01330 FDB $044E
2459 048F 01340 FDB $048F
245B 04D5 01350 FDB $04D5
245D 051E 01360 FDB $051E
245F 01370 OCTAVE RMB 1
2460 01380 OCT1 RMB 1
2461 01390 NOTECT RMB 1
2462 01400 TEMPO RMB 1
2463 01410 LENGTH RMB 1
2464 01420 ORG $3000
2465 01430 PLAYER CLR ,U END THE MUSIC WITH ZEROS
2466 01440 JSR $A92B CLS
2467 01450 LDX #TITLE
2468 01460 LDD #$4E5 PRINT @ LOCATION
2469 01470 STD $88 INTO CURSOR LOCATION
2470 01480 JSR $B99C PRINT THE TITLE
2471 01490 LDX #TCURVE START OF TIMBRE CURVE
2472 01500 LDU #$4000 WHERE TO STORE IT
2473 01510 LOOP3 LDD ,X++
2474 01520 STD ,U++
2475 01530 CMPU #$4100
2476 01540 BLO LOOP3
2477 01550 PSHS CC
2478 01560 ORCC #$50 NO INTERRUPTS
2479 01570 CLRS
2480 01580 JSR $A9A2 SET SOUND ON
2481 01590 JSR $A976
2482 01600 LDA #$3F LOTS OF LOCATIONS AT $3F00 - $3
FFF
302D 1F BB 01610 TFR A,DP SET THE DP REGISTER TO #$FF
302F 86 40 01620 LDA #$40 START OF TCURVE LOCATION
3031 97 C0 01630 STA $C0
3033 0F C1 01640 CLR $C1
3035 0F C2 01650 CLR $C2
3037 97 C3 01660 STA $C3
3039 0F C4 01670 CLR $C4
303B 0F C5 01680 CLR $C5
303D 97 C6 01690 STA $C6
303F 0F C7 01700 CLR $C7
3041 0F C8 01710 CLR $C8
3043 97 C9 01720 STA $C9
3045 0F CA 01730 CLR $CA
3047 0F CB 01740 CLR $CB
3049 97 CC 01750 STA $CC
304B 0F CD 01760 CLR $CD
304D 0F CE 01770 CLR $CE
304F 97 CF 01780 STA $CF
3051 0F D0 01790 CLR $D0
3053 0F D1 01800 CLR $D1
3055 108E 4100 01810 PLAY LDY #$4100 START OF CHORDS LOCATION
3059 6D A4 01820 LOOP1 TST ,Y IS FIRST VALUE A ZERO
305B 27 65 01830 BEQ OVER
305D EC A1 01840 LDD ,Y++ GET THE TEMPO AND LENGTH
305F 97 D3 01850 STA $D3 TEMPO
3061 97 D4 01860 STA $D4 TEMPORARY TEMPO
3063 D7 D2 01870 STB $D2 LENGTH
3065 A6 9F 3FC0 01880 LOOP2 LDA [$3FC0] GET ALL THE TCURVE VALUES
3069 AB 9F 3FC3 01890 ADDA [$3FC3]
306D A9 9F 3FC6 01900 ADCA [$3FC6]
3071 A9 9F 3FC9 01910 ADCA [$3FC9]
3075 A9 9F 3FCC 01920 ADCA [$3FCC]
3079 A9 9F 3FCF 01930 ADCA [$3FCF]
307D B7 FF20 01940 STA $FF20 PUT THEM IN PIA
3080 DC C1 01950 LDD $C1

```

Register D with the B value in the scale, we get that note's frequency. However, that frequency is only for the lowest octave. As in actual music, each octave increase will double the note's frequency, so it is necessary to first decrease the temporary OCT1 (1 to 5) by one to get 0 to 4. If it is a zero, it is in the lowest octave and doesn't need to have the note frequency changed. If it is greater than zero, shift Register D (the note frequency) to the left (double it) with:

ASLB
ROLA

Then decrease the temporary Octave 1 count by one. If the temporary OCT is still not zero, keep decreasing it and doubling Register D. When OCT1 is finally zero, save the note frequency by storing it at Location U.

Since we now have a note, decrease NOTECT by one. If NOTECT has reached zero, that is the end of the chord. If the NOTECT is not zero, check the next character in the chord. If it is a ";", that's the end of the chord (fill up the remainder of the chord with zeros). If it is an O branch to OCT, or else branch always back to note.

When a chord is complete, the tempo and length are stored at the beginning of the chord location and the whole process starts back at CHORO. If the first character of a chord is zero, it means the music is over. Be sure that the last entry in the NTABLE is FCB 0.

Each chord is now 14 bytes long — one byte each for the tempo and length and two bytes each for the six notes. You can give your program a title. The program will accept a ";" between chords to make it easier to read them. It is not necessary to make each chord a separate FCC line.

First, a word about a new register, the DP register. When using a command like LDA \$C0, EDTASM+ first looks to the DP register to get a one-byte number to go before the \$C0. Since the DP register is initially set to zero, the command is really LDA \$00C0. However, you can change the DP register. If using a lot of commands involving locations from \$3F00 to \$3FFF, let the DP register assign the \$3F, and you assign the other half. This saves both time and memory.

We can't directly set the DP register, however. Since it is such an important register, the computer doublechecks whether you actually want to change it. So, use this to change it:

LDA #\$3F
TFR A,DP

Now, using LDA \$C0, the computer actu-

3082	E3	A4	01960	ADDD	,Y	NOTE 1
3084	DD	C1	01970	STD	\$C1	
3086	DC	C4	01980	LDD	\$C4	
3088	E3	22	01990	ADDD	2,Y	NOTE 2
308A	DD	C4	02000	STD	\$C4	
308C	DC	C7	02010	LDD	\$C7	
308E	E3	24	02020	ADDD	4,Y	NOTE 3
3090	DD	C7	02030	STD	\$C7	
3092	DC	CA	02040	LDD	\$CA	
3094	E3	26	02050	ADDD	6,Y	NOTE 4
3096	DD	CA	02060	STD	\$CA	
3098	DC	CD	02070	LDD	\$CD	
309A	E3	28	02080	ADDD	8,Y	NOTE 5
309C	DD	CD	02090	STD	\$CD	
309E	DC	D0	02100	LDD	\$D0	
30A0	E3	2A	02110	ADDD	10,Y	NOTE 6
30A2	DD	D0	02120	STD	\$D0	
30A4	DA	D4	02130	DEC	\$D4	DECREASE TEMPORARY TEMPO
30A6	26	DE	02140	BNE	DELAY	
30A8	DA	D2	02150	DEC	\$D2	DECREASE LENGTH
30AA	26	DA	02160	BNE	CONT1	
30AC	31	2C	02170	LEAY	12,Y	NEXT CHORD LOCATION
30AE	20	A9	02180	BRA	LOOP1	
30B0	D6	D3	02190	LDB	\$D3	TEMPO
30B2	D7	D4	02200	STB	\$D4	TEMPORARY TEMPO
30B4	20	AF	02210	BRA	LOOP2	
30B6	30	84	02220	DELAY	LEAX	JUST MAKES A QUICK PAUSE
30B8	30	84	02230	LEAX	,X	
30BA	86	00	02240	LDA	#0	
30BC	86	00	02250	LDA	#0	
30BE	86	00	02260	LDA	#0	
30C0	20	A3	02270	BRA	LOOP2	
30C2	4F		02280	OVER	CLRA	
30C3	1F	8B	02290	TFR	A,DP	SET THE DP REGISTER BACK TO ZERO
30C5	35	01	02300	FULS	CC	
30C7	8D	A974	02310	JSR	\$A974	SOUND OFF
30CA	3F		02320	SWI		RTS IF IN BASIC
30C8	1415		02330	FDB	\$1415	
30CD	1516		02340	FDB	\$1516	
30CF	1718		02350	FDB	\$1718	
30D1	1819		02360	FDB	\$1819	
30D3	1A1A		02370	FDB	\$1A1A	
30D5	1B1C		02380	FDB	\$1B1C	
30D7	1C1D		02390	FDB	\$1C1D	
30D9	1E1E		02400	FDB	\$1E1E	
30DB	1F1F		02410	FDB	\$1F1F	
30DD	2020		02420	FDB	\$2020	
30DF	2121		02430	FDB	\$2121	
30E1	2222		02440	FDB	\$2222	
30E3	2223		02450	FDB	\$2223	
30E5	2324		02460	FDB	\$2324	
30E7	2424		02470	FDB	\$2424	
30E9	2424		02480	FDB	\$2424	
30EB	2425		02490	FDB	\$2425	
30ED	2525		02500	FDB	\$2525	
30EF	2525		02510	FDB	\$2525	
30F1	2525		02520	FDB	\$2525	
30F3	2525		02530	FDB	\$2525	
30F5	2525		02540	FDB	\$2525	
30F7	2524		02550	FDB	\$2524	
30F9	2424		02560	FDB	\$2424	
30FB	2424		02570	FDB	\$2424	
30FD	2423		02580	FDB	\$2423	
30FF	2323		02590	FDB	\$2323	
3101	2322		02600	FDB	\$2322	
3103	2222		02610	FDB	\$2222	
3105	2121		02620	FDB	\$2121	
3107	2121		02630	FDB	\$2121	
3109	2120		02640	FDB	\$2120	
310B	2020		02650	FDB	\$2020	
310D	1F1F		02660	FDB	\$1F1F	
310F	1F1E		02670	FDB	\$1F1E	
3111	1E1E		02680	FDB	\$1E1E	
3113	1E1D		02690	FDB	\$1E1D	
3115	1D1D		02700	FDB	\$1D1D	
3117	1D1C		02710	FDB	\$1D1C	
3119	1C1C		02720	FDB	\$1C1C	
311B	1C1B		02730	FDB	\$1C1B	
311D	1B1B		02740	FDB	\$1B1B	
311F	1B1A		02750	FDB	\$1B1A	
3121	1A1A		02760	FDB	\$1A1A	
3123	1A1A		02770	FDB	\$1A1A	
3125	1A19		02780	FDB	\$1A19	
3127	1919		02790	FDB	\$1919	

ally executes LDA \$3FC0. Since speed is critical in a music program, use the DP register frequently, remembering to set it back to zero when finished.

Next, is how to create a timbre curve (TCURVE), which is a numerical plot of the frequency each voice traces on a graph — all the highs and lows. It is this curve that gives each musical instrument its distinctive sound.

You can make a different curve for each voice, but this program uses the same curve for all six. Be sure that no single curve byte times the number of voices is greater than 255. In this curve, the highest byte can be $255/6 = 42$ or #2A.

The curve is stored from \$3000 to \$30FF (256 bytes). The two ROM subroutines set the computer to play notes. Next, set the DP register to #3F. The location of our TCURVE(s) is stored at \$(3F)C0, \$(3F)C3, \$(3F)C6, \$(3F)C9, \$(3F)CC, and \$(3F)CF. Now, load Register Y with the chord start location; the first thing the program will check is if the chord starts with zero. If so, this is the end of the music and the program turns off the sound and ends; if not a zero, the program loads the current tempo into \$(3F)D3, a temporary tempo into \$(3F)D4, and the length into \$(3F)D2.

The TCURVE value for each voice is added together and stored in \$FF20. Note 1 is stored at \$(3F)C1, Note 2 at \$(3F)C4, Note 3 at \$(3F)C7, Note 4 at \$(3F)CA, Note 5 at \$(3F)CD, and Note 6 at \$(3F)D0. Remember, each note is two bytes long. The temporary tempo in \$(3F)D4 is decreased by one. If it is not zero, a short delay (pause) is executed just for timing, then the program adds together the second byte of each timbre curve.

This continues until Tempo 1 has reached zero. When it has, the length is decreased and the whole cycle repeats until both the length and the tempo have reached zero. Register Y is loaded with the start of the next chord location, and everything repeats until all of the chords have been played and the program ends.

You may find it easier to enter the music one FCC line at a time, and then play it. Be sure to keep a FCB 0 at the end of the music. You can also watch your text program more closely, this way, to be sure it is not running into the TCURVE. If there are a lot of notes, you can relocate the TCURVE and chord start locations. If there are six different TCURVES, you will have to change locations. Just be sure that the start of each TCURVE is stored at \$(DP)C0, \$(DP)C3, \$(DP)C6, \$(DP)C9, \$(DP)CC and \$(DP)CF.

(Questions or comments about this tutorial may be directed to the author at Route 2, Box 216C, Mason, WI 54856-9302. Please enclose an SASE when requesting a reply.)

3129	1919	02800	FDB	\$1919
312B	1B1B	02810	FDB	\$1B1B
312D	1B1B	02820	FDB	\$1B1B
312F	1B1B	02830	FDB	\$1B1B
3131	1B1B	02840	FDB	\$1B1B
3133	1717	02850	FDB	\$1717
3135	1717	02860	FDB	\$1717
3137	1717	02870	FDB	\$1717
3139	1616	02880	FDB	\$1616
313B	1616	02890	FDB	\$1616
313D	1616	02900	FDB	\$1616
313F	1515	02910	FDB	\$1515
3141	1515	02920	FDB	\$1515
3143	1515	02930	FDB	\$1515
3145	1515	02940	FDB	\$1515
3147	1514	02950	FDB	\$1514
3149	1414	02960	FDB	\$1414
314B	1414	02970	FDB	\$1414
314D	1313	02980	FDB	\$1313
314F	1313	02990	FDB	\$1313
3151	1313	03000	FDB	\$1313
3153	1313	03010	FDB	\$1313
3155	1312	03020	FDB	\$1312
3157	1212	03030	FDB	\$1212
3159	1212	03040	FDB	\$1212
315B	1111	03050	FDB	\$1111
315D	1111	03060	FDB	\$1111
315F	1111	03070	FDB	\$1111
3161	1110	03080	FDB	\$1110
3163	1010	03090	FDB	\$1010
3165	1010	03100	FDB	\$1010
3167	1010	03110	FDB	\$1010
3169	1010	03120	FDB	\$1010
316B	0909	03130	FDB	\$0909
316D	0909	03140	FDB	\$0909
316F	0909	03150	FDB	\$0909
3171	0808	03160	FDB	\$0808
3173	0808	03170	FDB	\$0808
3175	0808	03180	FDB	\$0808
3177	0707	03190	FDB	\$0707
3179	0606	03200	FDB	\$0606

317B	0505	03210	FDB	\$0505
317D	0505	03220	FDB	\$0505
317F	0404	03230	FDB	\$0404
3181	0404	03240	FDB	\$0404
3183	0404	03250	FDB	\$0404
3185	0303	03260	FDB	\$0303
3187	0303	03270	FDB	\$0303
3189	0303	03280	FDB	\$0303
318B	0202	03290	FDB	\$0202
318D	0202	03300	FDB	\$0202
318F	0101	03310	FDB	\$0101
3191	0101	03320	FDB	\$0101
3193	0000	03330	FDB	\$0000
3195	0000	03340	FDB	\$0000
3197	0000	03350	FDB	\$0000
3199	0000	03360	FDB	\$0000
319B	0000	03370	FDB	\$0000
319D	0000	03380	FDB	\$0000
319F	0000	03390	FDB	\$0000
31A1	0000	03400	FDB	\$0000
31A3	0000	03410	FDB	\$0000
31A5	0000	03420	FDB	\$0000
31A7	0000	03430	FDB	\$0000
31A9	0000	03440	FDB	\$0000
31AB	0000	03450	FDB	\$0000
31AD	0000	03460	FDB	\$0000
31AF	0000	03470	FDB	\$0000
31B1	0000	03480	FDB	\$0000
31B3	0000	03490	FDB	\$0000
31B5	0000	03500	FDB	\$0000
31B7	0000	03510	FDB	\$0000
31B9	0000	03520	FDB	\$0000
31BB	0000	03530	FDB	\$0000
31BD	0000	03540	FDB	\$0000
31BF	0000	03550	FDB	\$0000
31C1	0000	03560	FDB	\$0000
31C3	0000	03570	FDB	\$0000
31C5	0000	03580	FDB	\$0000
31C7	0000	03590	FDB	\$0000
31C9	0000	03600	FDB	\$0000
2000	03610	END	START	

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Our youngest child was born eight years ago when our first CoCo was purchased. Time has flown by quickly and Shari is now completing second grade. She has recently taken possession of our original computer, which has been upgraded, of course, but retains its charming outward appearance — the chicklet keyboard and steel gray color (worn out here and there). It is as reliable as ever.

Shari is now full of math facts from school, her nightly homework including reviews of new things learned each day. Last week, she even surprised us with some pre-algebra examples. This learning method of practice and mastery is customary for her grade level, and we often use a variety of computer programs with the CoCo to aid her in maintaining those skills.

This month's article presents a new method of reviewing some basic math skills, concentrating on mental addition and subtraction. Also reinforced is the skill of thinking first before determining which operation is needed to compute each example.

The particular program provides a random starting-off number at the bottom right corner of the screen, a random target number to be reached at the bottom left

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

Math target practice

Shooting Math

By Steve Blyn
Rainbow Contributing Editor

corner. At the top of the screen are eight random numbers that include plus and minus signs. The object of the game is to shoot the numbers at the top of the screen, altering a given number to the target number. Below is an example:

+8 -3 -7 +5 +1 +6 -4 +2

*
14 TIMER 42 7

The bottom left number (14) is the target number to be reached while the bottom right number is the starting number. The child must first determine that using addition is probably the best — but

not the only — way to begin solving this problem. As is often the case with math problems, there are several ways to reach a solution.

The target may be reached by shooting +2 and +5 at the top, or by shooting -3, +6 and +2 twice. Part of the fun for students is to find how many ways an answer can be found. If the student understands negative and positive numbers, the amount of possible solutions becomes much greater.

The asterisk in the illustration represents the shooter, and arrow keys permit the student to move the shooter left and right. When the shooter is directly below the desired number, the space bar is pressed to shoot the number that is then added or subtracted accordingly to the running total at the bottom right of the screen. A round is won when the proper amount obtained in the running total corresponds to the target amount shown in the bottom left of the screen. Music plays and the student may press either ENTER to get another example or E to end the program.

A timer that allows roughly 100 seconds was incorporated to help focus attention on the task at hand. Without the timer it may be too tempting for the child to shoot randomly at numbers for the fun of it, eventually solving the example. You may alter the timer's length or remove it by revising or deleting Line 180.

Creatively alter any part of the program to help your child/students with math practice. We at Computer Island always enjoy hearing of new ideas for our programs.

The Listing: MATHSHOT

```
10 REM"MATHSHOOT"
20 REM"STEVE BLYN, COMPUTER ISLAND,
  STATEN ISLAND, NY, 1989"
30 CLS:TIMER=0:A=5+RND(15):G=5+
  RND(15):IF A=G THEN 30:REM A=TARGET
  AND G=RUNNING TOTAL
40 FOR T=1024 TO 1052 STEP 4
50 RR=RND(2):IF RR=1 THEN R=43 ELSE
  R=45
60 NN=48+RND(9)
70 POKE T,R:POKE T+1,NN:NEXT T
80 FOR T=1056 TO 1087:POKE T,156
  :NEXT T:FOR T=1440 TO 1471:POKE
  T,156:NEXT T
90 X=32:Y=24:C=8
100 RESET(X-1,Y):RESET(X+1,Y):SET
  T(X,Y,C)
110 AS=INKEY$
120 IF AS=CHR$(9) THEN X=X+1
130 IF AS=CHR$(8) THEN X=X-1
140 IF X<2 THEN X=1
150 IF X>61 THEN X=62
160 IF AS=CHR$(32) THEN GOSUB 210
170 M=INT(TIMER/60):PRINT@448,A:
  :PRINT@474,G::PRINT@460,"TIMER":
  M:
180 IF M>99 THEN PRINT@458,"TIM
  E IS UP ":GOTO 410
```

```
190 IF AS="" THEN 110
200 GOTO 100
210 PLAY"O4L150A"
220 FOR Y=22 TO 6 STEP -2:PLAY"C
  DC":SET(X,Y,8):NEXT Y
230 FOR Y=24 TO 6 STEP -1
240 RESET(X,Y):RESET(X+1,Y):NEXT
  Y
250 SET(X,24,8)
260 Y=24
270 H=PEEK(INT(X/2)+1024)
280 IF H<48 THEN 380
290 IF H>58 THEN 380
300 HS=CHR$(H):J=VAL(H$)
310 I=PEEK(INT(X/2)+1023)
320 K=PEEK(INT(X/2)+1022)
330 IF I=45 THEN G=G-J
340 IF K=45 THEN G=G-J
350 IF I=43 THEN G=G+J
360 IF K=43 THEN G=G+J
370 PLAY"L50GFEDC"
380 PRINT@448,A::PRINT@474,G:
390 IF G=A THEN PRINT@458,"YOU W
  IN !!!":GOTO 410
400 RETURN
410 FOR T=1 TO 5:PLAY"CDEFGFEDC"
  :NEXT T
420 ES=INKEY$
430 IF ES=CHR$(13) THEN RUN ELSE
  IF ES="E" THEN 440 ELSE 420
440 CLS:END
```


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Double- or Single-Sided?

I purchased two Radio Shack drives around 1982 (Cat. nos. 26-3029 and 26-1161A). Both are full-height with case and power supply. How can I tell if they are double- or single-sided?

*Donald M. Challans
Carlinville, Illinois*

All drives Radio Shack sold for the Color Computer prior to the current FD 502 half-height drive were single-sided. Most were 40-track capable, and capable of stepping as fast as 6ms per track. But the very first drive marketed for the Color Computer (Cat. No. 26-3022) had only 35 tracks and could not step faster than 20 ms per track.

The Cat. No. 26-1161A drive you refer to appears in my 1982 Radio Shack catalog as a Model III external drive unit. It is single-sided, probably 40-track, and compatible with the Color Computer.

As for telling if a drive is single- or double-sided, you need to inspect the drive. Sometimes this can be done without removing the case. Peer into the opening where the disk is inserted and look for: Single-sided drives with one head on one side of the disk, and on the other side a pressure pad, often made of white felt. Double-sided drives with two heads facing each other, one reason why you should never close the gate on a double-sided drive with no disk inside.

Note that the older Radio Shack full-height drives tend to be selected as Drive 0, 1, 2 and 3 via a special cable that has teeth missing from its connectors. Most other brand drives, including more recent Tandy drives, accomplish disk drive number selection via jumpers on the disk drive.

Serial Connections

Is it possible to connect more than one serial device into the I/O port on the back of my CoCo 3? Is there a database program capable of storing both digitized

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.



**By Marty Goodman
Rainbow Contributing Editor**

pictures and text and then retrieving them?

*Clay Daerwyler
Washington, Pennsylvania*

You cannot hook up more than one serial device to the CoCo port at one time. However, various companies, such as Micro-com, sell switchers that allow convenient switching between one of two or three serial devices (such as between a printer and a modem).

I know of no database program like the one you are describing. Too much memory and disk storage is required by such an application for it to be economical to develop and market such a program for the CoCo. I recommend a Macintosh since those applications are well developed on it. But be prepared to spend a minimum of a couple thousand dollars to get it up and running.

CoCo Crashing

My 512K CoCo 3 has been intermittently crashing, putting garbage on the screen and merrily on the disk drives. Could my Multi-Pak be at fault?

*Christiane Tom
Verdun, Quebec*

It is easy to determine if your Multi-Pak is at fault: Simply remove the Multi-Pak from the system, plug the disk controller directly into the CoCo 3 and see if the same problem occurs.

The older Multi-Paks (Cat. No. 26-3024) need to be upgraded by adding a new PAL chip, which can be ordered from any of a number of RAINBOW advertisers. It has been suggested that you must use one upgrade newer (26-3124) Multi-Paks with a special satellite board, such as the one described in my October '88 article ["Quick Fixes," Page 58], but I have yet to hear a confirmed report that this is required if you are careful not to use old, obscure add-on cards that are addressed to ports above \$FF7F.

Surprise for ROM Pak Owners

How can I put the ROM packs Rad Warrior and Super Pitfall onto disk? I do not own a Multi-Pak and am very reluctant to plug and unplug my disk controller.

*Steve Griffith
Signal Mountain, Indiana*

Part of the information needed to do this is posted in the Games database on Delphi. All you need to figure out is how to dump all 32K of the ROM pak to tape, then disk. Eventually someone will post how-to instructions for doing that.

Owners of Multi-Paks will be interested to know that by the time of the Chicago '89 RAINBOWfest, a device should be available from Zebra Systems that allows owners of Multi-Paks to run off disk any ROM pak game ever made, provided this is in your Multi-Pak. The Wild Card ROM pak emulator will also be of interest to those developing ROM software for the CoCo 3.

CoCo Running Hot

My 512K CoCo 3 tends to run hot. Is it best to unplug it when I am not using it?

*R. Daniels
Aurora, Colorado*

Yes, it is best not to run the machine all day if you are using it for only a couple of hours. At the same time, it is better to not switch it on and off several times within a short period because the shock of powering up and down causes more wear and tear on the machine than a half-hour of solid operation.

One of the problems of the CoCo 3 is its somewhat marginal power supply. In past columns I've discussed various remedies for this problem — fans, replacing the existing power transistor and a heat sink with high current handling the parts (like a TO 3 case 2N3055 transistor and a thick, finned aluminum heat sink), or simply

leaving the cover off the CoCo to allow for better convective cooling. These suggestions may help.

Multi-Pak and CoCo Max III Clash

When my upgraded 26-3024 Multi-Pak is used with my CoCo 3, CoCo Max III (an older version) crashes. Colorware says I have to pay for a new version to fix the problem. Is there any way to fix the Multi-Pak instead?

Dylan Kucera
Newmarket, Ontario

I am unaware of any specific problems caused by a properly upgraded 26-3024 Multi-Pak. In theory, the presence of the Multi-Pak is expected to produce, in some situations, minor timing problems with certain types of code. I know of no fix for such problems. You could try replacing all the chips in the Multi-Pak with a LS- or F-series chips (that offer shorter gate delays) and replacing the PAL chip with a network of a LS- or F-series TTL logic chips. It hardly seems worth the effort, however.

As a possible compromise, try desoldering and socketing just the LS367 and LS245 chips in the Multi-Pak, replacing them with S-series 367 chips and F-series 245 chips. This has some effect in decreasing the added gate delays caused by the Multi-Pak, though I don't know if it will solve your problem.

For the Sufficient Hacker

Can I adapt a Hercules type IBM monochrome graphics card to the CoCo 3? This would give 640-by-350 general purpose graphics resolution in monochrome. How about other, higher-resolution cards or hooking the old Tandy X-Pad to the CoCo 3 at 2 MHz? Also, how can I make a 2 megabyte upgrade for the CoCo 3?

Lorenz Christophe
Charleroi, Belgium

While a sufficiently single-minded hacker can do any of the things you suggest, I am quite confident that you will never see any of those things widely available for the CoCo 3 end-user. The reasons are the cost of such maneuvers and the lack of available software to take advantage of such things. And so, instead, there is a good market for such hardware modifications and the extremely high price of memory chips. Consider this: 640-by-350 is not much greater than 640-by-200. Not enough to spend the \$150 or so that such a modification would cost (plus the cost of a Multi-

Pak). And there are few, if any applications, commonly in use by large numbers of CoCo owners requiring more than 512K of memory. The \$320 worth of memory chips plus the cost of the add-on board for a 2-Meg upgrade is far better spent on a hard drive system.

Adding Drives

What sort of drive can I add to my FD 501 drive system? Can I add a 40- or 80-track double-sided drive? Or does the drive I add have to be a single-sided 35-track drive like the FD 501?

Rou Mills
Bombyville, Alabama

First of all, the drive in the FD 501 system is a TEC brand model 501 40-track single-sided drive. Thirty-five-track drives or single-sided, 40-track drives have not been made for many years. Next, yes you can hook a variety of 40- and 80-track drives together, but you have to know what you are doing. And, actually, it makes little sense to have one double-sided and one single-sided drive in the same system, since then you will not have a convenient way of making backups of the double-sided drive. There is no way to read the "other side" of a double-sided drive on a single-sided drive. It is physically impossible. You can, as a temporary measure, get a double-sided drive and install it, but you will soon want to get a second one of the same number of tracks, and toss out the FD 501 single-sided drive.

Note that while under OS-9, it is relatively easy to support different drive types. Under RS DOS this is rather tricky. I have consistently recommended ADOS (from SpectroSystems) for help with setting up systems using different kinds of drives. But you still need to know about drive selection, terminator resistors, cabling, and the like.

Extended ADOS 3

I have four questions: How can I best use my 80-track drives under Radio Shack Disk BASIC? Can I use the 6K of space so profligately wasted by the picture of the three Mugateers in my CoCo 3 ROM for useful software, like SIGMON, and how could I do this? How can I put four 8K DOSs inside a 27256 EPROM and use that in my disk controller, which is geared to using a 2764 EPROM? Finally, how can I force my CoCo 3 to power up with a different palette color set?

Thierry Lorenz
Fontaine, Belgium

In response to questions one and four, if you do not have a hard drive, then *Extended ADOS 3* (which is soon to be released, and requires a 27128 EPROM) is your best bet for supporting 80-track drives under RS DOS. If you do use a hard drive, then you might want to consider *Hyper-I/O* from Burke and Burke, which is geared to hard drive systems but can support other storage media as well. *ADOS (ADOS 3 or Extended ADOS 3)* will also allow you to configure your CoCo so that when you burn it into a DOS EPROM, the computer comes up with whatever palette and column width (32, 40 or 80) you want.

Concerning your second question, using the spare 6K in the ROM is possible but is one of those things that "if you have to ask how, don't try it." It involves significant hardware competence in desoldering and socketing a ROM chip, intimate knowledge of Disk BASIC and the GIME ROM select control. But I do know one software developer who has done almost exactly what you've suggested. "How-to" instructions for it would fill a good-sized article, though.

Now, to address Question three. Using a single 27256 chip as four banks of 8K DOSs is easy: Just burn the four DOSs into the chip, then raise pins 26 and 27 (the A13 and A14 lines on the chip) up in the air when you insert the chip into the 28-pin socket intended for a 2764. Tie each of those two lines high (to +5 volts, Pin 28) via a 4.7K ohm resistor. Then hook to each of those pins an SPST switch to ground. By putting those two SPST switches (which can be mini toggle or DIP switches) into any of their four possible combinations of settings (00, 01, 10, and 11) you can select each of the four banks in the EPROM. What you are doing here is providing for manual switching of the status (high or low) of the two high-order address lines on the chip.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.



We made a few utility programs, but somehow missed the PRINT @ screen, so this month we'll make a 32-by-16 PRINT @ screen.

Look at Listing 1, then key lines 1, 10 and 60. Line 20 creates the first boxcar, which contains the directions to create two rows. In size S4, A\$="R255D12L255D12". The super-boxcar contains four A\$ boxcars consisting of eight rows. Line 40 prints them on the screen, has an engine, DRAW"S4C4BMO,0", coupled to two super-boxcars, B\$, and a caboose, +"R255". S4C4 can be omitted from the engine because of the default syndrome. Likewise, you can have an extra super-boxcar, +B\$.

I decided to use S16, since the raw material in boxcar A\$ is easily converted from S4 to S16. Because S1 is four times larger than S4, we need one-fourth of the size needed in S4.

Divide the numbers in R255D12L255D12 by four and you get R64D3L64D3. This requires the engine in Line 40 to contain S16 and even the not needed C4. There is no change in the number of boxcars, though the caboose should be +"64" +"R255", or +B\$ will draw the 17th row. You have three ways to construct the bottom row:

Key in Lines 20 and 40, then run the program. Seventeen rows are created instead of 16, but you do not need an extra border program line.

At Line 30 the boxcar C\$ is created in S4, which must be put in the boxcar to tell CoCo you are changing size. (It can be placed inside the engine at Line 50.)

C\$ creates two vertical lines. A super-boxcar, D\$, contains four regular boxcars consisting of eight columns. In Line 50 the engine begins as the left border and tacks on four super-boxcars, D\$. After two super-boxcars are concatenated, you are in danger of overloading the train. A small engine, DRAW, is required to assist in pulling the rest of the train, while a caboose is required to add the third column. Can you use an extra +D\$ instead of +"D191"?

Actually, Line 50 can be assembled (engine; four super-boxcars; small engine; caboose;) to read:

```
50 DRAW"BMO,0"+D$+D$+D$+D$:DRAW"D191"
```

DRAW is required to set the third column.

Using an extra super-boxcar B\$ in Line 40 and D\$ in Line 50, instead of +"R255"

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer

Developing a PRINT @ screen utility program

Boxcars, Boxcars, Boxcars

By Joseph Kolar
Rainbow Contributing Editor

and "D191", respectively, saves seven bytes. Again, save a copy of your work.

The graphic screen, 64-by-32, is actually the PRINT @ screen divided into four quadrants. We will create the graphic character set, CHR\$(128) through CHR\$(143) for use on the Hi-Res screen, as well as GET-PUT to draw.

If you didn't sayonara the new utility, don't. If you did, load it back in by typing DEL60 and 1000 GOTO 1000.

Look over Listing 2. Key in Line 2, the DIM line; A(2) through H(2) and A1(2) through H1(2). A through H are the eight configurations of the 8-by-12 graphic CHR\$ boxes; A1 through H1 are the mates. For instance, CHR\$(133) is the mate of CHR\$(138); CHR\$(129) is the mate of CHR\$(142).

While developing the graphic set you don't want the PRINT @screen, so type in 15 GOTO 200 to bypass the utility for now. Each box is 8-by-12, calculated by dividing the number of full screen spaces, 256x192, by the PRINT @screen, 32x16. (256/32=8; 192/16=12; 8x12).

At Line 200, you can begin drawing the designs in pairs so that Line 200 houses one and Line 210 houses the mate.

The first, CHR\$(128), is located at (0,0); painting is done in C4. The painless way to figure the PAINT coordinates is as follows:

For color in the upper-left quadrant, augment the starting coordinates by +2,+2; for the lower-left quadrant, augment the starting coordinates by +2,+8; the upper-

right quadrant, augment +6,+2; and the lower-right quadrant by +6,+8.

The pairs and assigned variables are:

CHR(128) A	CHR\$(143) A1
(137) B	(134) B1
(131) C	(140) C1
(133) D	(138) D1
(139) E	(132) E1
(142) F	(129) F1
(141) G	(130) G1
(135) H	(136) H1

From the listing, key in lines 200 through 350, copying the designs on graph paper. Create them from the data in each program line and use the paint coordinates to shade them in.

When finished, check them out by first putting them in GET statements and assigning them the proper identifying variable.

Take the beginning coordinates extracted from the appropriate DRAW line, and add +200 to the DRAW line number used for the associated GET. Thus, DRAW line 200 +200=GET line 400. DRAW line 250+200 produces GET line 450.

Since each graphic character occupies an 8-by-12 area, to the beginning coordinates, (0,0), add +8,+12. (0+8=8; 0+12=12). The ending coordinates = (8,12). After a few lines, you'll get the hang of it. In fact, the vertical coordinates are always (H,0)-(H,12). Likewise, the horizontal component, H, always ends as 0 in the starting coordinate and eight in the ending coordinate.

The quickest and surest way to proceed is to LIST200; add 200 to the DRAW line to get the GET line number (Use the coordinates in the listed line as the beginning coordinates in the GET line); calculate and add the ending coordinates; add the assigned variable and tack on G. Without referring to the GET part of the listing, work them out and key them in.

When you've keyed in all the GET statements, run the program to check for any Syntax errors. Check the graphics characters for the proper variables assigned as well as any errors in the listing.

In order to use PRINT @, or graphic utility, make the following additions:

```
3 GOTO 199
99 GOTO 99
DEL100
199 PMODE3,1:PCLS
600 PCLS:SCREEN1,0
999 GOTO 20
```

Now you must start at a horizontal coordinate that is divisible by eight, (0,8,16,...240) and a vertical coordinate

that is divisible by 12, (0, 12, 24, 36, ... 180).

Key in the following test line: 610 PUT (240,180)-(248,191),A,PSET, then run the program. Substitute all the variables, one at a time, and check them out. To get rid of the utility, put a REM in front of Line 999, masking it.

There is a flaw in this utility; you can't use the last column to set graphic blocks. (There is a way to force it, but we won't do so.) Instead, you get the proverbial bunched-up junk. It's a trade-off — loss of the last column for easily calculated even-numbers. You can't use ending coordinates (256,192); 256 is out of CoCo's range. You can use 192-255 on the vertical because they all are equivalent, in this case, to 191 and within CoCo's range.

Substitute other values for those in Line 610. This gives you the feel of working with coordinates adaptable to the grid intersecting points.

One advantage over the staid Lo-Res graphics is that you can remove the utility and align the designs to any pair of starting coordinates such as (4,4), (7,12), (3,25). However, the +8,+12 must be added consistently for the ending coordinates to get a viable graphic character.

The grid needs locating guides, so I divided the screen into four quadrants. Type

in:

60 DRAW":C2BM128,0D96N1128NR128D96C4"

Note the cross-hair Line 60 ending in C4. I didn't want to take a chance. CoCo is reminded to return to C4 after the cross-hairs are created in C2.

The utility may make the character set appear distorted due to the way the set is drawn or to a shadow inherent on your TV. Blank areas are partly overprinted on the grid lines, so it is important to wipe out the utility by masking Line 999.

The acid test is to create a design on the utility and then wipe it out to see what is left.

Delete Line 610 and any other lines introduced while conducting the test, making sure the utility is operational, then unmask Line 999 and run the program. The utility should now be divided into four quadrants.

Here's an idea! Place CHR\$(140), C1, in the box two lines above the white horizontal guideline, directly left of the vertical white line. The starting coordinates are (120,72). A PUT Line 700 is created. (See Listing 2.) Another PUT Line 10 creates a similar box next to it. Now run the program, each line in succession.


Can you anticipate my next move? If

you can't, you may be considering an alternate move as a springboard to greater things.

After you finish Line 770, take a break. Did you notice that when making a design that returns to the point of origin, such as a circle or oval, rather than proceeding in a clockwise or counter-clockwise direction, the graphic blocks are set according to the horizontal orientation? This is to simplify hunting for coordinates. Since any blocks in the same horizontal row have the same beginning and ending vertical component coordinates, it's easy to get confused with the jumble of coordinates constantly manipulated.

A few curliques were added beginning with Line 800, and I abandoned the constraints of the formal block locations beginning with Line 840. The graphics characters are manipulated into position across the box delineator lines, using odd numbered vertical coordinates. It is sometimes a bit difficult so take it slow.

Lines 880 and 890 center the characters, while Line 900 creates a bit of color in the middle, from the 4-by-6 box square of CHR\$(135), H. Any one of E, F, G or H will fit in, but it's easier to work with H because the 4-by-6 box is oriented in the upper left-hand quadrant. It's exercise to move it -- 2, -3 to center in the exact middle.




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Mask Line 999 to get rid of the utility. The four curliques, B and B1, can be separated a bit more. The test is relocating the four units to give better symmetry to the design, pull in the two vertical members, or improve the design.

Incidentally, you can use the DRAW and PAINT statements to fill in the central area.

However, there's no sense in GETTING without PUTTING. The raw material has already been created. Use it!

Before working on the program, save a copy. Try these changes:

```
10 PMODE4,1: PCLS:SCREEN1.1
600 PCLS:SCREEN1.1
```

Then run the program.

Now, change lines 10 and 600 to the other screen, SCREEN1.0. Change line 199 to 199 PMODE4,1:PCLS and run the program.

Change lines 10 and 600 back to SCREEN1.1 and run the program.

Listing 1: BOXCAR1

```
0 'PRINT@
1 CLEAR500
10 PMODE3,1:PCLS:SCREEN1,0
20 A$="R64D3L64D3":B$=A$+A$+A$+A$
30 C$="S4D191R8U191R8":D$=C$+C$+C$+C$
40 DRAW"S16C4BM0,0"+B$+B$+B$
50 DRAW"BM0,0"+D$+D$+D$+D$:DRAWD$
60 GOTO60
```

Listing 2: BOXCAR2

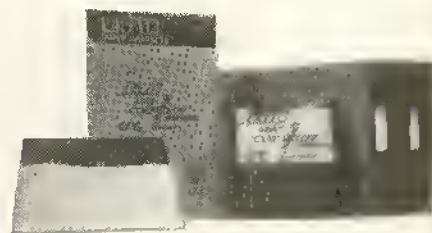
```
0 'LISTING2
1 CLEAR500
2 DIM A(2),B(2),C(2),D(2),E(2),F(2),G(2),H(2),A1(2),B1(2),C1(2),D1(2),E1(2),F1(2),G1(2),H1(2)
3 GOTO199
10 PMODE3,1:PCLS:SCREEN1,0
20 A$="R64D3L64D3":B$=A$+A$+A$+A$
30 C$="S4D191R8U191R8":D$=C$+C$+C$+C$
40 DRAW"S16C4BM0,0"+B$+B$+B$
50 DRAW"BM0,0"+D$+D$+D$+D$:DRAWD$
60 DRAW"C2BM128,0D96NL128NR128D96C4"
99 GOTO99
199 PMODE3,1:PCLS
200 DRAW"BM0,0R8D12L8U12":PAINT(2,2),4,4
210 DRAW"BM10,0BR8BD12BL8BU12":PAINT(12,2),1,4
220 DRAW"BM20,0BR4R4D6L8D6R4U12":PAINT(26,2),4,4:PAINT(22,8),4,4
230 DRAW"BM30,0R4D12R4U6L8U6":PAINT(32,2),4,4:PAINT(36,8),4,4
240 DRAW"BM40,0R8D6L8U6":PAINT(42,2),4,4
250 DRAW"BM50,0BD6R8D6L8U6":PAINT(52,8),4,4
260 DRAW"BM60,0R4D12L4U12":PAINT(62,2),4,4
270 DRAW"BM70,0BR4R4D12L4U12":PAINT(76,2),4,4
280 DRAW"BM80,0BR4R4D6L4U6":PAINT(86,2),4,4
290 DRAW"BM90,0R4D6R4D6L8U12":PAINT(92,2),4,4
300 DRAW"BM100,0BD12BR4R4U6L4D6":PAINT(106,8),4,4
```

```
310 DRAW"BM110,0R8D6L4D6L4U12":PAINT(112,2),4,4
320 DRAW"BM120,0BD6R4D6L4U6":PAINT(122,8),4,4
330 DRAW"BM130,0R8D12L3U6L4U6":PAINT(132,2),4,4
340 DRAW"BM140,0R4D6L4U6":PAINT(142,2),4,4
350 DRAW"BM150,0BR4R4D12L8U6R4U6":PAINT(156,2),4,4
400 GET(0,0)-(8,12),A,G
410 GET(10,0)-(18,12),A1,G
420 GET(20,0)-(28,12),B,G
430 GET(30,0)-(38,12),B1,G
440 GET(40,0)-(48,12),C,G
450 GET(50,0)-(58,12),C1,G
460 GET(60,0)-(68,12),D,G
470 GET(70,0)-(78,12),D1,G
480 GET(80,0)-(88,12),E,G
490 GET(90,0)-(98,12),E1,G
500 GET(100,0)-(108,12),F,G
510 GET(110,0)-(118,12),F1,G
520 GET(120,0)-(128,12),G,G
530 GET(130,0)-(138,12),G1,G
540 GET(140,0)-(148,12),H,G
550 GET(150,0)-(158,12),H1,G
600 PCLS:SCREEN1,0
700 PUT(120,72)-(128,84),C1,PSET
710 PUT(128,72)-(136,84),C1,PSET
720 PUT(112,84)-(120,96),D1,PSET
730 PUT(136,84)-(144,96),D,PSET
740 PUT(112,96)-(120,108),D1,PSET
750 PUT(136,96)-(144,108),D,PSET
760 PUT(120,108)-(128,120),C,PSET
770 PUT(128,108)-(136,120),C,PSET
800 PUT(112,60)-(120,72),B1,PSET
810 PUT(136,60)-(144,72),B,PSET
820 PUT(112,120)-(120,132),B,PSET
830 PUT(136,120)-(144,132),B1,PSET
840 PUT(88,87)-(96,99),C1,PSET
850 PUT(80,87)-(88,99),C1,PSET
860 PUT(160,87)-(168,99),C1,PSET
870 PUT(168,87)-(176,99),C1,PSET
880 PUT(126,36)-(134,48),D,PSET
890 PUT(126,144)-(134,156),D,PSET
900 PUT(126,93)-(134,105),H,PSET
999 GOTO200
1000 GOTO1000
```


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Memory Jumpers

I would like to know if I could use the jumpers on my CoCo 2 to increase the memory to 64K? I noticed on one of the chips, there is a section marked 128K and 64K, and there are two bar strips in the middle of the board. What are they for?

Darrell D. Garrison
Michigan

The jumpers on the board are for the different-sized ROMs in bits (64K — 8K times 8 for Color BASIC, and 128K — 16K times 8 for Disk Color BASIC). See Marty Goodman's *Upgrading CoCo's Memory* in the March '89 issue to upgrade your memory to 64K.

AND...

I have been programming for eight years now. Every once in awhile I come across a program that uses AND in a strange way, that is, 4 AND 2. What is the purpose of this?

Terry Ritchie
Havelock, North Carolina

What you describe is a logical or Boolean AND. For example, suppose X=45 (which in binary is 00101101) and Y=35 (binary 00100011), were ANDed together (Note: 1 AND 1 = 1, 1 AND 0 = 0, 0 AND 1 = 0, 0 AND 0 = 0) as follows:

```

0 0 1 0 1 1 0 1 <-X
| | | | | | |
0 0 1 0 0 0 1 1 <-Y
  
```

we get:

```

0 0 1 0 0 0 0 1
  
```

which is 33 decimal. This type of arithmetic is used for both speed (faster than multiplication and division) and convenience when manipulating registers.

Oops!

Regarding your answer to M. Willingham in THE RAINBOW, February '89, I've tried and tried to get it to work, but always get a TM Error in Line 5010. Is there a

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

DOCTOR



ASCII

**By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra**

typographical error in the listing?

Rand Boland
Arvada, Colorado

Sorry for the typo. The = following the quote in that line should really be a +, the non-shifted character on the same typewriter key.

Citizen Arrest

I bought a CoCo 3 three months ago and have a Citizen 120-D printer that is Epson-compatible. I'm interested in printing graphics, and so bought DeskMate 3. The problem is, it won't print the graphics. Is DeskMate 3 compatible with my printer? If not, is there a fix in DeskMate 3, or is the problem in the arrangement of the SW-1 (eight microswitches)? I also typed the program DUMPBAS (RAINBOW, September '88, Page 98) and it doesn't work either. I hope you can help me.

Jorge Lopez Rodriguez
Guadalajara, Jalisco, Mexico

Tandy, with a few exceptions, releases all CoCo graphics programs with drivers for Tandy/Radio Shack printers that recognize a different set of graphics codes than the more common Epson/IBM-compatible printers. The Tandy printers print a row of graphics seven dots high while the Epson/IBM printers do eight at a time. The high order-bits correspond to the opposite pins in the two protocols. It should be apparent, by now, that fixing these programs for your

printer is not a simple task, but involves almost a complete rewrite of the printer drivers.

Pin-out Figures

Is there a way of making my CoCo disk drive (FD 502) work on any of the Tandy IBM-compatibles?

Dennis Craig
La Vista, Nevada

CoCo floppy-disk drives are hardware-compatible with the IBM standard. If you cannot figure out the pin-outs, keep in mind that you can order a maintenance manual for any Tandy product from Radio Shack National Parts.

Editor Troubles

I've been having some trouble with my CoCo 3 and the EDIT command. When I am editing a program that has been saved in the ASCII format, EDIT refuses to recognize lines that LIST fine, but get a UL (Unidentified Line) Error with EDIT. This problem also occurs when I try to edit a program that was saved in ASCII format, but is now in BASIC. What is going on here? Also, what is the proper poke and counter-poke for high speed on the CoCo 3? (These pokes appear in Marc Campbell's BASIC editor, Buddy, July '88, Page 34.)

Brian Davidson
Idaho Falls, Idaho

If you type the ASCII text for a program using a word processor, and you are not careful, you might add spurious carriage returns, causing the problems described above. The pokes are Speed up: POKE &HFFD9,0, and Slow back down: POKE &HFFD8,0.

Screen Sizing

I am presently using a CoCo 3 with a Magnavox Amber Monitor, and a Tandy Direct-Connect Modem Pak. Is it possible to change my screen size to a 40-by-24, instead of the 32-by-16 that I get when I access my modem?

Donald Nelson
Indianapolis, Indiana

The 32-by-16 screen is programmed into the Pak's ROM. Using Mikeyterm, available on tape or disk (See April's column.), can give you the resolution you want.

Direct-Connect Commy

Is there any way to use Timmy's DCM-3

Direct-Connect Modem with the Commodore 128? Also, I heard of a graphics tablet that Tandy used to make. Where can I find this?

Ian Coveny
Warsaw, New York

The Commodore has a strange non-standard serial port. (See Marty Goodman's April column for details.) Tandy used to sell an X-Pad for \$349. They were closed out at Radio Shack stores for \$99 over two years ago. I doubt that you can find any available.

A Better Spreadsheet?

I am currently using DynaCalc for my spreadsheet purposes and am able to say that I am quite impressed and pleased. Just out of curiosity, are you aware of a better spreadsheet, maybe one that compares to Lotus that is compatible with OS-9 Level II? Also, what can I do to expand the memory capability of DynaCalc to take advantage of my 512K and how can I get rid of the extra linefeed during printout? The manual says any value up to and including eight.

John Wilson
Las Vegas, Nevada

DynaCalc is currently OS-9's best. There are very few OS-9 programs accessing more than 64K each, primarily because Tandy/Microware has never released a large memory version C compiler for the CoCo. Check the output of xmode /p to make sure it is set at -1f. Also check the settings on your printer. You can also get double spacing if you print a line larger than your printer is capable of and it wraps.

Tricky Tracks

I just purchased an FD 502 drive. On OS-9, I configured my system to 40 tracks. While in a 40-track setup, I tried to make a copy of my system master. When OS-9 read off of the 35-track system master, it gave me a Read Error (Error 244). I tried copying the system master in 35-track setup, and when OS-9 started to write to the 40-track formatted disk, it gave me a Wrong Type Error (Error 249). How can I use 40-tracks? I'm puzzled.

Brennan A. Cropper
Port Barre, Louisiana

The way to make a 40-track system is to use Config from /d0 to make a 40-track system on a 35-track formatted disk in /d1. Use the resulting disk to boot up again.

Then format a new disk in /d1, use Cobbler on the disk in /d1, copy all files over to /d1 and it will finally be your 40-track boot disk.

Disk Dilemma

I have a CoCo 2 (Model 26-3026). When I try any disk commands, the disk drive goes on and runs and will not stop! The disk-drive light will not go on either. I have tried the disk controller and drive on my other CoCos and have no trouble with it. The CoCo works good with cassette and ROM Pak programs plugged-in, with no trouble. Extended Color BASIC programs run fine, which I think tells me the ECB ROM chip is working. What components can I check?

Ned Bassick
Fairfield, Connecticut

The CoCo 2 does not supply 12 volts at the ROM port, as the older, larger CoCos did. It sounds like the controller is for one of them. The solution is to get a newer five-volt-only controller, a Multi-Pak Interface, which supplies the 12 volts, or kludge up a 12-volt source.

Patch Patching

In the January '88 issue, Page 55, you printed a patch for Disk EDTASM, by Roger A. Krupski. I had to make two changes to his program before it would work with my CoCo 3:

```
335 GOTO 350
610 DATA END.0
```

Without these added lines, I got a Disk Full Error, and an SN (Syntax) Error in Line 480.

Lt. Day
Zanesville, Ohio

Thanks for sharing the info.

For a quicker response, your questions may also be submitted through Rainbow's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

One-Liner Contest Winner . . .

Issue commands to your CoCo 3's cassette recorder with this one-liner, which controls the audio and motor functions. Press F1 to turn on audio and motor; press F2 to turn them off. Press ALT to CLOAD the program; press CTRL+O CLOADM the program.

The listing:

```
10 CLS:PRINT@128,"          F1=ON
F2=OFF          ALT=CLOAD
CTRL=CLOADM":IFPEEK(343)=191THE
NAUDIOON:MOTORON:GOTO1$ELSEIFPEE
K(344)=191THENAUDIOOFF:MOTOROFF:
GOTO1$ELSEIFPEEK(341)=191THENCLO
AD:GOTO1$ELSEIFPEEK(342)=191THE
NCLOADM:END:GOTO1$ELSE1$
```

Paul Fogle
Mountain Grove, MD

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

One-Liner Contest Winner . . .

After prompting the user for a beginning and ending address, this short utility prints the addresses and their contents to the screen. If the PRINT command is changed to PRINTH-2, the information will be sent to the printer.

The listing:

```
10 CLS:PRINT@11,"PRINT PEEK":PRI
NT:INPUT"TO LIST THE 'POKED' VAL
UES OF A RANGE OF ADDRESSES, IMP
UT (B) BEGINNING, (E) ENDING A
DRESS. INPUT B,E":B,E:FORA=B T
O E:PRINT A PEEK(A):NEXTA:PRINT
:PRINT:INPUT "DO AGAIN? (Y/N)":P
$:IFPS="Y"THEN1$ELSEEND
```

William L. Duke
Gardnerville, NV

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

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If you have an idea for the "Wishing Well," submit it to Fred clo THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Just recently I finished reading George Burns' touching tribute to his late wife, *Gracie: A Love Story*. In it, a poker-faced George asked: "Gracie, how many days are there in a year?"

"Seven," she replied.

"Seven?" George questioned.

"Seven. Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. If you know any more, George, just name them."

While I won't try to decipher the logic behind Gracie's innocent confusion, I thought it an interesting way to introduce this month's program: *Calendar II: The Days of the Week*.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Building on last month's Calendar program

"Just Say Goodnight, Gracie"

By Fred B. Scerbo
Rainbow Contributing Editor

It is not so much a sequel as much as a "prequel" to *Calendar*, but last month's program was so much fun to write I couldn't help putting it out first.

Calendar I helps students identify the months of the year using graphic drawings. This month, we will concentrate on learning the days of the week. There are no fancy graphics, largely because I could not think of any to logically convey a specific day. (Sunday was easy, but Wednesday? Prince spaghetti day?)

As in recent months, this program helps

fill a void in early childhood education computer software.

Calendar II is simple to operate. There are no menus or difficult instructions; to run the program, just press ENTER after seeing the titlecard. You are then presented with a screen titled "Days of the Week," with numbers one through seven highlighted in a row of boxes. When the first day, Sunday, appears, the number one flashes on the screen. Pressing ENTER advances the screen to the next day, continuing until the @ button is pressed. The days keep looping to impress upon the child that even though Sunday is the first day, it also follows Saturday from the previous week.

After pressing the @ key, the screen displays "Press the Number" and then gives a random day of the week. The child presses a number (1 to 7) that corresponds to the day shown. If the correct number is pressed, a row of smiling faces appears at the bottom of the screen; if incorrect, it shows a row of frowns.

Pressing ENTER allows you another shot at the day shown; pressing the @ key gives you the scorecard and pressing C continues, restarts or ends the program. That's all there is to it. Let your young ones try it along with *Calendar I*, to help them become more comfortable with the computer and keyboard. □

✓ 45	.....18	225	.....126
90	.....76	290	.....115
155	.....120	END	.....219

The Listing: WEEKDAYS

```

1 REM*****
2 REM*   THE DAYS OF THE WEEK   *
3 REM*   COPYRIGHT (C) 1989     *
4 REM*   BY FRED B. SCERBO      *
5 REM*   60 HARDING AVENUE      *
6 REM*   NORTH ADAMS, MA 01247  *
7 REM*****
8 CLEAR2000
9 CLS
10 PRINTSTRING$(32,220);STRING$(
32,156);:FORI=1TO192:READA:PRINT
CHR$(A+128);:NEXT
15 PRINTSTRING$(33,128);:FORI=1T
08:PRINTCHR$(205)CHR$(205)CHR$(2
00)CHR$(128);:NEXTI
20 FORI=1TO8:PRINTCHR$(204)CHR$(
204)CHR$(200)CHR$(128);:NEXT
25 PRINT@357," AN INTRODUCTION

```

```

TO ";:PRINT@389," THE DAYS OF T
HE WEEK ";
30 PRINT@421," BY FRED B.SCERB
O ";:PRINT@453," COPYRIGHT (C
) 1989 ";
35 DATA110,108,109,101,108,108,1
09,100,110,,96,109,108,109,100,1
11,,100,110,100,110,108,105,101,
108,108,109,100,110,108,108,109
40 DATA106,,101,,101,,106,,10
1,,110,106,,106,,106,,101,101,
,,101,,106,,101
45 DATA106,,101,99,99,103,,106,
,,101,99,103,,106,109,,106,,106,
,,101,101,99,99,103,,107,99,99,10
3
50 DATA106,,101,,101,,106,,10
1,,100,,106,100,106,106,,106,,10
1,101,,101,,106,100,98,
55 DATA106,,101,,101,,106,,10
1,,96,,106,,108,106,,106,,101,10
1,,101,,106,,100,98
60 DATA107,99,103,101,98,,103,97
,,107,99,106,103,99,103,97,107,,9
7,107,97,107,99,102,101,98,96,10

```

```

3,97,107,,,101
65 X$=INKEY$:IFX$<>CHR$(13) THEN 6
5
70 PMODE0,1:PCLS1:SCREEN1,1
75 FORI=0TO250STEP37:LINE(I,50)-(
(30+I,80),PRESET,BF:NEXT
80 FORI=0TO250STEP37:LINE(I+4,54
)-(26+I,76),PSET,B:NEXT
85 DRAW"BM16,70C1S4U10NG2BR32R6D
5L6D5R6BR32R6U5NL4U5NL6BR30D5R6U
5D10BR32R6U5L6U5R6BR30NR6D10R6U5
NL6BU5BR32R6D4GD5"
90 DRAW"BM10,26C0R2NU12R10U12NL1
2BR6ND12R10D6NL10D6U12BR6F6NE6D6
BR12R8U6L8U6R8BR16ND12R10D12NL10
BR6U6NR8U6R8BR16R6ND12R6BR6D12U6
R10D6U12BR6NR8D6NR8D6R8BR16NU12R
8NU8R8NU12BR6NR8U6NR8U6R8BR6NR8D
6NR8D6R8BR6U12D6R2NE6F6"
95 COLOR1,0
100 LINE(0,0)-(252,2),PRESET,B
105 LINE(0,40)-(252,38),PRESET,B
110 LINE(0,0)-(2,40),PRESET,B
115 LINE(252,0)-(256,40),PRESET,
B
120 LINE(0,90)-(252,92),PRESET,B
125 LINE(0,144)-(256,192),PRESET
,BF
130 LINE(4,148)-(250,186),PSET,B
F
135 A$(1)="BR16R10U6L10U6R10BR6D
12R10NU12BR6U12F12NU12BR6":D$="R
2NU12R10U12NL12BR6ND12R10D6NL10D
6U12BR6F6NE6D6":A$(1)=A$(1)+D$
140 A$(2)="BR14U12R8ND12R8D12BR6
U12R10D12NL10BR6U12F12NU12BR6"+D
$
145 A$(3)="BR12U12L8R16BR6D12R10
U12BR6NR8D6NR8D6R8BR6R10U6L10U6R
10BD12BR6"+D$
150 A$(4)="NU12R6NU12R6NU12BR4NR
8U6NR8U6R8BR4R2ND12R8D12NL10BR4U
12F12U12BR4NR8D6NR8D6R8BR4R6U6L6
U6R6BD12BR4"+D$
155 A$(5)="BR10U12L6R12BR6D12U6R
8U6D12BR6NU12R8U12BR6ND12R8D6L6F
6BR6R8U6L8U6R8BD12BR6"+D$
160 A$(6)="BR24U6NR8U6R8BR6ND12R
8D6L6F6BR6NU12BR6"+D$
165 A$(7)="BR2R8U6L8U6R8BR6ND12R
8D6NL8D6U12BR6R6ND12R6BR6D12R8U1
2BR6ND12R8D6L6F6BR6"+D$
170 COLOR0,1
175 FORI=1TO7:LINE(0,100)-(256,1
34),PRESET,BF
180 DRAW"BM2,130C0S8":DRAW A$(I)
185 DRAW"BM4,131C0S8":DRAW A$(I)
190 Q=I*37-37
195 LINE(Q+4,54)-(26+Q,76),PSET,
B
200 LINE(Q+4,54)-(26+Q,76),PRESE
T,B

```

```

205 X$=INKEY$:IFX$=CHR$(13) THEN 2
15ELSEIFX$="@" THEN 225
210 GOTO195
215 NEXT
220 GOTO170
225 LINE(0,100)-(256,134),PRESET
,BF
230 LINE(6,6)-(248,34),PRESET,BF
235 W=RND(7):DRAW"BM2,130C0S8":D
RAW A$(W)
240 DRAW"BM4,131C0S8":DRAW A$(W)
245 DRAW"BM16,26S4U12R10D6NL10BR
4D6U12R10D6L6F6BR4NR10U6NR10U6R1
0BR4NR10D6R10D6NL10BR4R10U6L10U6
R10BR18ND12L6R12BR4D12U6R8U6D12B
R4NR8U6NR8U6R8BR16ND12F12U12BR4D
12R10U12BR4ND12R6ND12R6D12BR4R2N
U12R10U6NL10U6NL12BR4NR8D6NR8D6R
8BR4U12R10D6L6F6"
250 X$=INKEY$:IFX$="@" THEN 315ELS
EIFX$="" THEN 250
255 X=VAL(X$):IFX=0 THEN 250
260 IFX>7 THEN 250
265 FORP=1TO10:Q=X*37-37:LINE(Q+
4,54)-(26+Q,76),PSET,B:LINE-(Q+4
,54),PRESET,B:NEXTP
270 IF X=W THEN 295
275 NW=NW+1:FORK=0TO200STEP40:CI
RCLE(28+K,168),20,0,.9:CIRCLE(28
+K,176),8,0,.9,.5,1:PSET(24+K,16
4,0):PSET(32+K,164,0):NEXTK
280 X$=INKEY$:IFX$=CHR$(13) THEN 2
85ELSEIFX$="@" THEN 315ELSE 280
285 LINE(4,148)-(250,186),PRESET
,BF
290 GOTO250
295 NC=NC+1:FORK=0TO200STEP40:CI
RCLE(28+K,168),20,0,.9:CIRCLE(28
+K,176),8,0,.9,1,.5:PSET(24+K,16
4,0):PSET(32+K,164,0):NEXTK
300 X$=INKEY$:IFX$=CHR$(13) THEN 3
05ELSEIFX$="@" THEN 315ELSE 300
305 LINE(4,148)-(250,186),PRESET
,BF
310 GOTO225
315 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
320 PRINT@229,"WHILE DOING"NW"WR
ONG."
325 NQ=NC+NW:IF NQ=0 THEN NQ=1
330 MS=INT(NC/NQ*100)
335 PRINT@293,"YOUR SCORE IS"MS"
%."
340 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
345 X$=INKEY$:IFX$="Y" THEN RUN
350 IFX$="N" THEN CLS:END
355 IFX$="C" THEN SCREEN1,1:LINE(4
,148)-(250,186),PRESET,BF:GOTO22
5
360 GOTO345

```


NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Games

Left Beats Right By Keiran Kenny

4K

Not long ago I read an article maintaining that left-handed people react about one-fiftieth of a second faster than right-handers in sports like tennis. I forgot the details of the scientific explanation, but if you look at the number of left-handers among the top-seeded and most successful tennis players, it seems that there is something to it.

Reaction lets you test the theory. A cursor appears at the top of the screen, and after a random period it drops down the screen. You are prompted to use your left and right hand alternately to stop it before it has dropped ten screen spaces. If you press the space bar before it starts to fall, you "jump the gun" and have to start again. Your score is 10 minus the number of screen spaces remaining if you stop it.

The loop in Line 140 holds the cursor at each position just long enough to make it visible. The value DL in Line 10 can be increased if you want.

Although I am right-handed, my left hand scored consistently better than my right. Now, if I can get some training in ambidexterity... see you at Wimbledon.

The Listing: REACTION

```
Ø 'REACTION' by Keiran Kenny,  
  Sydney, 1989.  
1 ' COPYRIGHT 1989  FALSOFT, INC  
1Ø DL=2  
2Ø FORT=1TO2Ø:CLSØ  
3Ø IFT/2=INT(T/2) THEN5Ø  
4Ø PRINT"RIGHT HAND";:GOTO6Ø
```

```
5Ø PRINT"LEFT HAND";  
6Ø PRINT@16,CHR$(159);  
7Ø GOSUB28Ø  
8Ø IFINKEY$=CHR$(32) THENPRINT@45  
4,"YOU JUMPED THE GUN!";:GOSUB28  
Ø:CLSØ:GOTO3Ø  
9Ø PRINT@16,CHR$(128);:P=48:FORX  
=1TO1Ø  
1ØØ PRINT@P,CHR$(159);  
11Ø PRINT@P,CHR$(128);  
12Ø IFINKEY$=CHR$(32) THEN16Ø  
13Ø P=P+32  
14Ø FORD=1TODL:NEXT  
15Ø NEXT:X=X-1  
16Ø IFT/2=INT(T/2) THEN18Ø  
17Ø SR=1Ø-X:TR=TR+SR:PRINT@39Ø,"  
RIGHT SCORE"SR"/ 1Ø";:GOTO19Ø  
18Ø SL=1Ø-X:TL=TL+SL:PRINT@39Ø,"  
LEFT SCORE"SL"/ 1Ø";  
19Ø GOSUB28Ø  
2ØØ K$=INKEY$:NEXTT  
21Ø CLSØ:PRINT@228,"RIGHT SCORE"  
TR"/ 1ØØ";  
22Ø PRINT@26Ø," LEFT SCORE"TL"/  
1ØØ";  
23Ø PRINT@326,"TRY AGAIN? Y/N";  
24Ø K$=INKEY$:IFK$="" THEN24Ø  
25Ø IFK$="Y" THENTR=Ø:TL=Ø:GOTO2Ø  
26Ø IFK$="N" THENCLS:END  
27Ø GOTO24Ø  
28Ø FORD=1TO3ØØ+RND(6ØØ):NEXT:RE  
TURN
```

Asteroid Dodge

By Clayton R. Moore

4K

In *Asteroid* you are allotted three ships. The object of the game is to avoid the asteroids (graphic blocks) coming up the screen toward you. Your ship (the letter V) is located at the top of the screen. Maneuver your position to the right or left using the joystick. Pressing the fire button clears the screen of all oncoming obstacles. Use this option sparingly to avoid impending disaster.

After accumulating 500 points you reach Level II. The entrance to Level II is a wall with a few openings stretching across the screen. Your goal is to pass through an opening without hitting the wall.

Levels continue to change every 500 points in a similar fashion. Additionally, more screen-clearing bombs are awarded on completion of each level. The score is shown at the end of the game. How far can you get?

The Listing: ASTEROID

```

0 ' COPYRIGHT 1989  FALSOFT, INC
1 '*****
2 '*ASTEROID DODGE*
3 '*      BY      *
4 '*    C. MOORE  *
5 '*   JULY 1988  *
6 '*****
7 L=1
8 P=16
9 POKE65495,0
10 CLS
11 X=JOYSTK(0)
12 IF X>37 THEN A=1 ELSE IF X<2
5 THEN A=-1 ELSE A=0
13 IF P+A<0 THEN A=0 ELSE IF P+
A>31 THEN A=0
14 P=P+A
15 PRINT@P,"V";
16 FORI=1TO1

```

```

17 PRINT@ RND(32)+447,CHR$(RND(
127)+128);
18 NEXT I
19 PRINT@480
20 IF PEEK(1056)+P=175 THEN M=M
+1
21 IF PEEK(1056+P)<>96 THEN 290
22 IF C<-3 THEN 250
23 IF PEEK(65280)=126 THEN CLS:
C=C-1
24 IF PEEK(65280)=254 THEN CLS:
C=C-1
25 SC=SC+1
26 L1=L1+1
27 IF L1=500 THEN L=L+1:L1=0:SO
UND 1,1:GOTO 430
28 GOTO110
29 POKE65315,63
30 FORI=1TO75
31 PRINT@P,CHR$(RND(127)+128);
32 POKE65312,RND(255)
33 NEXT
34 CLS
35 M=M-1
36 C=0
37 IF M=-3 THEN 390
38 GOTO110
39 CLS
40 PRINT@108,"gameover";
41 PRINT@140,"SCORE";SC
42 END
43 CLS
44 FORI=447TO479
45 PRINT@I,CHR$(128);
46 NEXT
47 FORI=1TO6
48 PRINT@RND(32)+447," ";
49 NEXT
50 GOTO110

```

Elevators

By Paul Nalos

16K
ECB

In this game you are a red dot, maneuvered with the right joystick. The object of the game is to keep from going off the screen limits. The dot jumps if you press the fire button and responds to right and left movements of the joystick accordingly.

The Listing: ELEVATOR

```

0 ' COPYRIGHT 1989  FALSOFT, INC
1 L=2
2 C=2
3 CLS0
4 GOSUB 290
5 L=L+1:IF L>31 THEN L=0
6 E=L-1:IF E=-1 THEN E=31
7 FOR DR=0 TO 5
8 DI=DR
9 IF EL=1 THEN GOSUB 170:GOTO 1
60

```

```

10 SET(DI,L,C)
11 RESET(DI,E)
12 SET(63-DI,31-L,C)
13 RESET(63-DI,31-E)
14 SET(31-DI,31-L,C):RESET(31-D
I,31-E)
15 SET(32+DI,L,C):RESET(32+DI,E
)
16 NEXT DR
17 IF Y=32 OR Y=-1 THEN PLAY"GC
":END ELSE RESET(X1,Y1):X1=X:Y1=Y
:SET(X,Y,4)
18 IF Y=31 THEN Y=Y+1:GOTO 170
19 IF POINT(X,Y+1)<>0 THEN Y=Y-
1:GOTO 170
20 IF Y=30 THEN Y=Y+1:GOTO 170
21 IF POINT(X,Y+2)=0 THEN Y=Y+1
:GOTO 170
22 IF JOYSTK(0)>50 THEN X=X+2
23 IF JOYSTK(0)<10 THEN X=X-2
24 P=PEEK(65280):P=P OR 128
25 IF P<>255 THEN Y=Y-1

```



```

260 IF X>63 THEN X=63
270 IF X<0 THEN X=0
280 GOTO 50
290 REM SCENE
300 FOR Y=0 TO 31 STEP 6

```

```

310 FOR X=0 TO 63
320 SET(X,Y,8)
330 NEXT X,Y
340 X=0:Y=0
350 RETURN

```

Wordmake By Logan Bleckley, III

4K

WordMake lists 20 letters on the screen from which you try to form 10 words at least four letters long. Being a short program, no spell-checker is incorporated into the game. Your score is shown after 10 words have been spelled.

The Listing: WORDMAKE

```

0 ' COPYRIGHT 1989  FALSOFT, INC
1 "WORDMAKE" BY LB..10/88
3 ONBRK GOTO200
4 Z=RND(100):FORQ=1TO2:Y=RND(100)
):NEXTQ:CLS
5 PRINT@33,"CAN YOU MAKE 10 WORD
S OF THIS?"
6 PRINT"2&3 LETTER WORDS NOT ALL
OWED!"

```

```

8 FORQ=1TO15
10 A=RND(26)+64
20 B$=B$+CHR$(A)
30 NEXTQ
40 PRINT@102,B$+"AEIOU"
50 '
60 FORQ=1TO10
70 PRINTQ;:INPUT">";C$
72 D=LEN(C$):IFD=4THENF=F+10
73 IFD<4THEN70
74 IFD=5 THEN G=G+15
76 IFD=6 THEN H=H+20
78 IFD>6 THEN J=J+30
80 NEXTQ
82 SC=F+G+H+J:PRINT"<<<SCORE>>>"
,SC"!!!"
90 PRINT"GOOD!!AGAIN? HIT[ENTER]"
"
100 INPUTZ:RUN
110 CLS:LIST
200 END

```

Home Help

Diary By Bradley Hurt

CoCo 3
Disk

This program helps you keep a personal diary. Type in the listing, then save it and run the program. At the prompt "What Month?" enter a month, using a maximum of eight characters. This creates a filename. The next prompt is "What Day?". Type in the day, creating the filename extension. Now you will see either "This month doesn't exist!" or the diary page already created for that date. If the month doesn't exist, press the Y key to create a file. At the "Dear Diary" screen, enter your message of the day. File length is limited to eight lines of text minus seven characters.

The Listing: DIARY

```

0 CLEAR 2000
1 ' COPYRIGHT 1989  FALSOFT, INC
5 POKE &H95C9,87:POKE 65314,20:P
ALETTE 13,63
10 ON ERR GOTO 85
15 ON BRK GOTO 80
20 CLS:L$=" "

```

```

25 PRINT"<-----<DIARY>-----"
-----><----->BY<-----"
----->-----=<BRAD HURT>=
-----";
30 PRINT"WHAT MONTH?":LINE INPUT
M$:PRINT"WHAT DAY?(EX 025)":LIN
E INPUT DAY$:GOSUB 45
35 GOTO 20
40 CLS:PRINT"DEAR DIARY,";CHR$(1
3);LAG$;CHR$(13);"ANY KEY TO CON
TINUE ":EXEC 44539:CLOSE#1:RETUR
N
45 OPEN"D",#1,M$+"/"+DAY$
50 FIELD#1,255 AS L$
55 IF LOF(1)<1 THEN 60 ELSE 40
60 CLOSE#1:OPEN"D",1,M$+"/"+DAY$
,255:FIELD#1,255 AS L$:PRINT"THI
S MONTH DOESN'T EXIST!":PRINT"DO
YOU WANT TO START THIS MONTH (Y
/N)?"::EXEC 44539:IF INKEY$="N"
THEN CLOSE#1:KILL M$+"/"+DAY$:RE
TURN ELSE GOTO 65
65 'START NEW DAY OF MONTH
70 CLS:LINE INPUT"DEAR DIARY,"

```

```

" ; LAG$
75 LSET L$=LAG$:PUT#1,2:CLOSE#1:
RETURN
80 PRINTCHR$(13);"ARE YOU SURE (
Y/N)?" ;:EXEC 44539:IF INKEY$<>"Y
" THEN GOTO 20 ELSE CLOSE#1:END
85 IF ERNO=31 THEN RUN

```

```

90 IF ERNO=1 THEN PRINT"?SN ERRO
R IN " ;ERLIN:END
95 IF ERNO=28 THEN PRINT"DISK FU
LL ERROR";:EXEC 44539:RUN
100 IF ERNO=26 THEN RUN
105 PRINT"?UNDEFINED ERROR IN LI
NE " ;ERLIN:END

```

Utilities

Disks Named "Misc"

By Merle Miller

16K
Disk

Are there others of you out there who have a bunch of disks named "MISCL"? I had so many, one of my early wishes was for a listing on paper of the programs on each disk. There are plenty of programs to provide this, but each always has some little something I don't like.

Over a period of time, and with bits and pieces from RAINBOW, I put together *MM DIR*. It makes a hard copy of your miscellaneous programs on disks, saving you time when looking for a specific program. Set the printer at 1200 baud or change the rate in Line 20 to suit your needs.

The Listing: *MM DIR*

```

0 ' COPYRIGHT 1989  FALSOFT, INC
10 'THIS IS "MM DIR" W/A$,B$,C$,
X$,Y$,Z$

```

```

20 POKE150,40
30 PRINT"DISK NAME/#":INPUTX$:PR
INT"CAT.NO.":INPUTZ$:PRINT"DATE
":INPUTY$:PRINT"PRINTER READY?(Y
)":INPUTA$:PRINT#-2,CHR$(30);"DI
SK ";X$;" - CAT# ";Z$;" DATE ";Y
$:POKE111,254:DIR:PRINT:PRINT"FR
EE GRANS":POKE111,254:PRINTFREE(
0)
40 PRINT"DO YOU WANT TO ADD NOTE
S? (Y/N)"
50 INPUT A$
60 IF A$="Y" THEN 70 ELSE END
70 CLS:WIDTH40:LOCATE2,2:PRINT"E
NTER 80 CHAR.MAX. FOR EACH LINE"
:LOCATE8,3:PRINT"USE HYPENS-NOT
COMMAS":LOCATE2,8:PRINTB$:INPUTB
$:PRINT#-2,B$:LOCATE3,20:PRINT"W
ANT ANOTHER LINE?":LOCATE3,22:PR
INT"(Y/N)":INPUT C$:IFC$="Y" THEN
70 ELSE END

```

Sound Control

By Joel Hegberg

64K

Sound Control is a short program that allows you to toggle sound output on and off in BASIC. It multitasks using BASIC's interrupts so you don't know it's there until you use SOUND, PLAY, or AUDIO commands.

Simply enter the program into your Color Computer, save it, and then run it. The program searches for typing errors in the DATA statements and notifies you of needed corrections. Remember to save the program if you make any changes. Once the program is running perfectly, a message appears displaying, "Sound Control Is Now Installed." To disable and enable sound, press the CTRL and S keys at the same time. This is very useful for playing noisy programs when everyone's asleep.

Sound Control should work on any Color Computer with the newer keyboard (like the one the CoCo 3 comes with) and at least 64K of memory. If you are using a CoCo 1 or 2, first run a ROM-

RAM converter program like the one on Page 157 of the May '88's issue of THE RAINBOW (Listing 3). Also, for CoCo 1 and 2 users, pressing the Reset button disables the program. Simply type in POKE 65503,0 and it is re-enabled.

The Listing: *SNDCTRL*

```

0 ' COPYRIGHT 1989  FALSOFT, INC
10 'SOUND CONTROL
20 'CREATED FEBRUARY 2, 1989 BY
30 'JOEL MATHEW HEGBERG
40 '936 NORTH TWELFTH STREET
50 'DE KALB, ILLINOIS 60115
60 '
70 '
80 CLEAR500,32700:CLS:IFPEEK(269
)*256+PEEK(270)=32702 THEN PRINT"S

```



```

OUND CONTROL ALREADY INSTALLED."
:END
90 TL=0:LT=0:T=32700:LN=0:RESTOR
E
100 READA$
110 IF LEN(A$)=3 THEN 150
120 IFA$="**" THEN 180
130 A=VAL("&H"+A$):POKET,A:LT=LT
+A:TL=TL+A
140 T=T+1:GOTO 100
150 A=VAL("&H"+A$)
160 IFA<>LT THEN PRINT"DATA ERRO
R IN LINE #";LN+240:STOP
170 LT=0:LN=LN+10:GOTO 100
180 READ A$:A=VAL("&H"+A$)
190 IFA<>TL THEN PRINT"ERROR IN D
ATA STATEMENTS.":STOP
200 PCKE521,PEEK(269):POKE522,PE

```

```

EK(270)
210 FORT=1000TO1006:READA:POKET,
A:NEXTT:EXEC 1000
220 CLS:PRINT"SOUND CONTROL IS N
OW INSTALLED."
230 END
240 DATA FF,0,34,76,B6,1,56,81,B
F,27,9,7F,7F,524
250 DATA BD,35,76,6E,9F,2,9,B6,1
,55,81,FB,26,52E
260 DATA F0,B6,7F,BD,26,EE,43,B7
,7F,BD,B6,7F,761
270 DATA BC,43,B7,7F,BC,81,FF,27
,7,86,39,B7,A9,6BE
280 DATA A2,20,7,86,CE,B7,A9,A2,
86,86,B7,A9,76,701
290 DATA 20,CC,**,205E
300 DATA 142,127,190,191,1,13,57

```

Graphics

Simple Draw By Darren Day

16K Disk
Cassette
Modification

Simple Draw is a bare-bones drawing program created to work with all CoCos. Commands are simple to use and the listing is fairly simple to understand.

The joysticks are used to position the graphics cursor on the desired screen position. The fire button sets a point on the screen, and the C key clears a point on the screen. The CLEAR key clears the whole screen, the S key saves a whole screen on a disk (or cassette) file named SCREEN, and the L key loads the SCREEN file into memory (the screen).

While you probably won't get a picture printed in "The CoCo Gallery" using this program, it still can be used to create interesting title screens for your programs. Just insert a program line such as:

```
10 LOADM"SCREEN":EXEC
```

Simply press a key to continue the program. I hope that this program will be helpful and enjoyable.

The Listing: SIMPLDRA

```

0 1 COPYRIGHT 1989  FALSOFT, INC
5 1      SIMPLE DRAW
      DARREN B. DAY
      JULY 1988
10 1 FOR CASS. I/O CHANGE SAVEM
    TO CSAVEM & LOADM TO CLOADM

```

```

IN LINE 35.
15 CLS(0)
20 X=JOYSTK(0):Y=INT(JOYSTK(1)/2
)
25 IF PEEK(65280)=126 OR PEEK(65
280)=254 THEN SET(X,Y,5)
30 A$=INKEY$
35 IF A$="C" THEN RESET(X,Y) ELSE
IF A$="S" THEN SAVEM "SCREEN",102
4,1536,44539 ELSE IF A$="L" THEN
LOADM "SCREEN"
40 IF POINT(X,Y)=5 THEN 20
45 SET(X,Y,5):SOUND 255,1:RESET(
X,Y):GOTO 20

```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one screen sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's bi-monthly "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your full name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS.

★ Current Record Holder • Shutout

ADVANCED STAR TRENCH (THE RAINBOW, 7/86)
4,750 ★Stephane Martel, Laval, Quebec
4,500 Frankie DiGiovanni, Olney, MD
4,475 David Schaller, Clarkston, WA

ANDRONE (Radio Shack)
20,820 ★Gary Budzak, Westerville, OH

ASTRO BLAST (Merk Dela)
49,356 ★Brian S. Brame, Lakeside, CA
48,825 Tony Bacon, MI. Vernon, IN
24,980 Matthew Smith, Courtenay, British Columbia

ATOM (Radio Shack)
Round 2 Cobalt (#24) James Donagan, Saugerties, NY

BASH (SRB Software)
744,900 ★Andy Carter, North Charleston, SC

BEAM RIDER (D & D Software)
1,082,400 ★Rose Snyder, Cincinnati, OH
673,160 ★James Snyder, Cincinnati, OH

BEE ZAPPER (THE RAINBOW, 9/87)
28,275 ★William Cnrlle, Bryans Road, MD
15,785 David Hartmann, Osoyoos, British Columbia
12,825 Frederick Lajole, Middleton, Nova Scotia

BIOSPHERE (Radio Shack)
64,000 ★Ty Stockdale, Racine, WI

BLITZ (THE RAINBOW, 6/88)
126,400 ★Jerry Anderson, Jacksonville, FL
69,150 Ryan Schlecht, Gackle, ND
63,150 Kreig Bryson, Woodstock, GA

BOUNCING BOULDER (Dicom Products)
24,186 ★Dennis Zobel, Centereach, NY
16,874 Michael Zobel, Centereach, NY
10,930 Petrck Gernaeu, Ste-Croix, Quebec

BREWMASTER (NOVASOFT)
51,825 ★Wendy Staub, Moundsville, WV

CASHMAN (MichTron)
9,870 ★Martin Parada, Arcadia, CA

CAVEWALKER (Radio Shack)
209,870 ★Todd Von Natta, Isle of Palms, SC
34,720 Chris Kremo, Balhah, CT
30,309 Cathy England Kimble, Glendale, AZ

CLOWNS & BALLOONS (Radio Shack)
888,980 ★Faye Keefer, Augusta, GA
217,500 Frankie DiGiovanni, Olney, MD
70,180 Charles Andrews, Delta Jct, AK

COLOR BASEBALL (Radio Shack)
599-0 ★Frank C. D'Amato, Brooklyn, NY
595-0 Tom Chernobino, Brooklyn, NY
412-0 Brian S. Brame, Lakeside, CA
389-0 Wes Latimer, Grangeville, ID
387-0 Joel Stockdale, Racine, WI
276-0 Kevin Wennemacher, Payne, OH
238-0 John Valonine, Marlborough, CT
172-0 Ryan Murray, Herrin, IL
149-0 John Brackel, Wilmington, OH
137-0 Scott Galvez, Tiverton, RI
137-0 Jennifer Johnson, Meriden, CT
132-0 Keren Rimmer, Adams, NY
130-0 Matthew Snider, Pinehurst, TX
130-2 Greg Allen, Alwalder, CA
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113-0 Chris Donato, Enclid, OH

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316,550 Alan Merlin, Cornwall, Ontario

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100,107,600 ★Earl Foster, Lynchburg, VA

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308 Edn Carlton, Charleston, SC

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81 ★Brad Wilson, Lihia Springs, GA
85 Paul Summers, Orange Park, FL
85 David and Shirley Johnson, Leicester, NC

Roy Grant, Toledo, OH
86 Melanie Moor, Florence, AL
86 Curtis Trammel, Murphysboro, IL

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43,806 Domingo Martinez, Miami, FL
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357,890 Jason Clough, Houston, TX
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702,520 Joseph Delaney, Augusta, GA
400,000 Tom Jones, Milan, IL
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174,410 Carann Jentzsch, Dufur, OR

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1,802-0 Jimmy Garner, Ft. Worth, TX
1,120-0 Kim Johns, Port Cog., British Columbia

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GROBOT (ChAdren's Computer Workshop)
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8,090 Curt Lebel, Louisville, KY

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103 Phil Holden, Moraga, CA
76 Chris Nuwar, Lockport, NY

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400/422 Jeff Hollman, Waterloo, Ontario
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4,088,000 Gabriel Riley, Richfield, ID
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257,600 Keith Cohen, Rocky Mount, NC

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186,710 Tony Harbin, Cullman, AL

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14,305 David Schulze, San Antonio, TX
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LANOER (T&D Software)
780 ★Art Enkin, Neapan, Ontario

LASER SURGEON: THE MICROSCOPIC MISSION (Activision)
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LUNAR-HOVER PATROL (Spectral Associates)
73,500 ★Aron Wuelling, Gledwin, MI

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7,155 Krelg Bryson, Woodstock, GA
7,035 Thomas S. Corbini III, Yaupon Beach, NC

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1,519,500 Jim Hammons, Martin City, Montana
1,085,500 Tracey Lee Slick, Atwood, Ontario
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586,500 Jonathan Toloski, Torrington, CT
1,266,050 ★Craig Schneider, North Platte, NE
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150,560 ★Tom Cherubino, Brooklyn, NY
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15,150 Cray Augsburg
5,000 Chris Nuwer, Lockport, NY
4,100 Angie Mittelsteadt, Kiel, WI
4,050 Julie Kaphammer

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65,529 Joseph H. Campbell, Norfolk, VA

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427,700 ★Marnia Schalm, Edson, Alberta
247,900 Jason Bauer, Menominee, MI
231,900 Jessica Wilkins, Saymore, TN

SANDS OF EGYPT (Radio Shack)

67 ★Tristan Tarkuc, Richmond, Ontario
82 Edward Rocha, Cobleskill, NY

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95,000 ★Karin Hillon, Conway, AZ
40,000 David Hartmann, Osoyoos, British Columbia

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63 ★Lell Smadberg, Churubusco, IN

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61,745 ★Scott Galveo, Tiverton, RI
50,840 Chris Krems, Bethel, CT

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27,270 Jocelyn Hellyer, Montgomery, IL
25,510 Donald Knudson, Minto, ND

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14,702 Richard Winkelbauer, Bronx, NY
13,794 Phillip Holsten, Modesto, CA

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73,091 ★Jell Remick, Warren, MI

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63,476 Chris Krems, Bethel, CT
21,410 Scott Saverton, Jamestown, NY

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102 Mike Ali, San Juan Capistrano, CA
91 Chris Nuwer, Lockport, NY

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7,280 Jason Kopp, Downs, IL
6,200 John Weaver, Amsterdam, NY

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97,400 Jeff Morrison, Marlow, OK

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96,000 Amber Reynolds, White City, Saskatchewan

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117,080 Bill Millington, Meridan, CT

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6,550 Flini Weller, Swerthmore, PA

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3,110 Kathy Rumpel, Arcadia, WI
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5,117 ★Jon Hobson, Plainfield, WI

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357,550 Martin Parada, Arcadia, CA
268,350 Tony Bacon, MI. Vernon, IN

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1,950,000 Blaka Cadmus, Reading, PA

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65,535 ★Mike Woycheshen, Coquitlam, British Columbia

ZORK I (Infocom)

350/326 ★Konno Grant, Toledo, OH
350/587 Matthew Yarrows, Easthampton, MA

— Vivian Turbeville

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this bi-monthly column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

● Chad Presley: In *Wild West*, if you give Jenny the fake map, she will send Black Bart to the canyon. Lasso the tree, climb the rope and then it is a good idea to use the dynamite. I have no idea what to do next.

Farrell Kenimer
Phoenix, Arizona

● Alan Lindaberry: In *Dungeons of Daggorath*, you do not need a ring to kill the stone giant. You need the wooden sword and leather shield. You must kill the snake in order to get the shield. Attack with the shield, press M and run away. Then, go after him again until your heartbeat climbs up, or until he dies. After killing the giant, press E and see if he left you a ring. You will not get the steel ring right away. First you will get the Vulcon ring, then iron and soon.

In *Dungeons of Daggorath*, to get the wizard, am I supposed to go up in the dungeon, or go down in the holes of the dungeon?

Chuck Carpinello
Rensselaer, New York

● Frankie DiGiovanni: In *Dungeons of Daggorath*, to incant the Supreme ring, you must first read the beginning of the book, where you will find another name for the ring. Next look up the meaning of the word in the dictionary; you will find the right word, but in the wrong form. The word is a synonym for *supreme*. After finding the correct word, you will finish the game.

Is there any way to get the scroll left by the wizard's image? Also, what does the flask do?

Derek Wood
Sydney, Nova Scotia

● Alan Lindaberry: In *Bedlam*, to get past the dog you will need the blue pill and the meat. Put the blue pill in the meat and feed it to the dog. He will die and you will be able to pass. To get the

green key, stand outside the shock room and get it with the window hook. Before you leave the kennel, be sure you have the green key, as it is necessary to escape.

Jon Hobson
Plainfield, Wisconsin

● Frankie DiGiovanni: In *Gantelet II*, to get out of the first room of the nineteenth level, open the door in the bottom-right corner of the room.

Jouathau Wanagel
Freeville, New York

Here are some hints for *The Interbank Incident*: The first things you need are the tracker and the rod. When you have these, go to each of the four cities and use the tracker with the rod fitted into the tracker. This will tell you where the hideout is located. You will also need six of the eight clues that the people will give you *before* you can enter the hideout.

Here are a few more tips: Read the newspaper to the guard and give him the matchbook at the air force base in Germany; buy the lady on the beach a drink; give the dice to the guy in the casino in Rio; and be sure to have either the rope or the Code book to solve the adventure.

David Ring
Lyman, Nebraska

In *The Interbank Incident*, what do you do with the dice, hi-level gold card, newspaper, hundred dollar bill, ring and postcard? There are lots of doors I can unlock (apartments, souvenir shop, Eiffel Tower, etc.), but I can't enter. I go back and forth and never get anywhere.

Romvel Bruehl
Baton Rouge, Louisiana

In *Shenanigans*, how do I convince the computer to open the trap door in the cavern so I can go up, get my pole and win the game?

David McCoy
Franklin, North Carolina

In *In Quest for the Starlord*, do you do anything at the lake? How do you get past the machinery?

In *Horror House*, where do you find the key to get out of the house?

Matthew Smith
Bourtenay, British Columbia

In *Caladuril Flame of Light*, where do you get the birdseed to feed the parrot? How do you get through the four locked doors. What do you do with the conveyor belt?

Anne Beuson
Uniontown, Ohio

In *A Mazing World of Malcom Mortar*, when I'm through all three mazes, how can I collect the three magic bricks and still trap Malcom Mortar to get into Level Two?

William C. Millington
Meriden, Connecticut

In *Dragon Blade*, I have come to a huge stone door after locating the whirlpool, but I can't open it.

In *Dallas Quest*, how do you kill the spider?

Scott Brady
Lake Worth, Florida

In *Sea Quest*, I have the air tanks but I can't use the air compressor. What else do I need to do?

In *The Black Sanctum*, every time I type GO MIRROR or ENTER MIRROR the screen locks up. What should I do from here?

Greg Dorsha
Williston, North Dakota

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

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In last month's column, I covered the ABCs of how a disk drive works — its mechanical parts and how it accesses the data available on the disk. I'll continue on that track, giving more detail to the differences between 40- and 80-track drives. Part of the article will concentrate on designing a small circuit that allows CoCo users to read standard CoCo disks with an 80-track drive.

The need for 80-track drives came about with the need to store more data on one disk. If a 40-track double-sided drive can hold 360K of data, then an 80-track double-sided drive should hold 720K of data. In fact, it does. But instead of going back to the 8-inch drive, which has more data storage, the manufacturer decided to double the amount of data by doubling the amount of tracks on the same-size disk. The only problem with this is that it becomes incompatible with the 40-track drives. The differences make it impossible for an 80-track drive to read a 40-track disk.

One difference between the two is obviously the number of tracks. But how is that possible, when both are 5¼-inch drives? Well, the difference is in track size. On a 40-track drive the track density is 48 TPI (Tracks Per Inch). At 48 TPI, it takes just under one inch to make 40 tracks. If you look at a disk, one inch is about enough room to fit 40 tracks. If 40 tracks take up one inch, then 80 tracks take up two inches; that's too much to fit on a 5¼-inch disk. So the disk drive manufacturers decided to make the tracks thinner and closer together. To make them fit on the same size disk, the track density was doubled to 96 TPI. That allows 80 tracks to fit on the same size disk.

This, however, causes a few problems for both the drive and disk manufacturers. So the read and write head had to be made thinner and the stepping mechanism more accurate. This adds to the cost of the drive. In addition, the disk has to hold twice the data and be of better quality. Since the track size is smaller (thinner), the magnetic surface is smaller. In order to get the same reliability, the quality must be better — both with the heads and disks. When

Stepping into the world of 40- and 80-track drives

The DEFs of Disk Drives

By Tony DiStefano
Rainbow Contributing Editor

using 80-track drives, it is recommended that you use 96 TPI-rated disks. If you don't, you may not have any problems while the disks are new, but in the long run valuable data is safer with this type of disk.

Now, let's step back a little. The mechanism that steps the head back and forth is usually a motor called a stepper that can precisely rotate within certain speed limits. When Radio Shack first started selling drives, it took 30 ms. (milliseconds) to make each step, but as motors improved,

drives had shorter stepping times. Today an average 40-track drive has a stepping time of 6ms. When the 80-track drives came out, the manufacturer wanted it to be just as fast, so they increased the stepping time again to 3ms.

Look at Figure 1. It shows a few tracks on a typical disk. On the left side of the drawing are tracks made by a 40-track drive at 48 TPI. The track on the outer edge is Track 0; the next is Track 1, then Track 2 and so on. Tracks made by an 80-track drive are twice as thin as those of a 40-track drive. Notice, though, that Track 0, is on the outer edge on both sides.

Take a disk formatted in a 40-track drive and place it in an 80-track drive. If you step the 80-track drive to Track 0, you can read it; trouble starts when you want to read the next track and so on. Look again at the right-hand side of Figure 1. Imagine that you step the 80-track side one track inward to Track 1. Now move over to the right-hand side and see where you are. On the 40-track side, you are still on Track 0, yet the software expects Track 1. Now step in again. The software expects Track 2 but gets Track 1. For every track stepped, the result is half of what you expect. If you step up to Track 10, then you only get Track 5.

Stepping in or out, the ratio is always 2 to 1. Knowing this, I thought I could make a circuit that would generate two pulses for every one that came in. It would then be

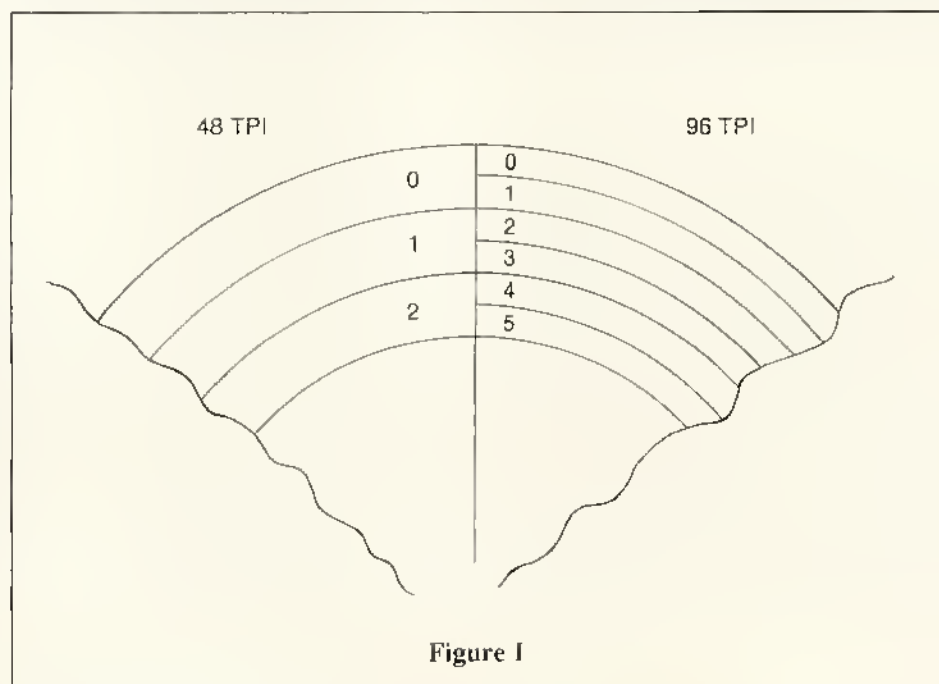


Figure 1

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

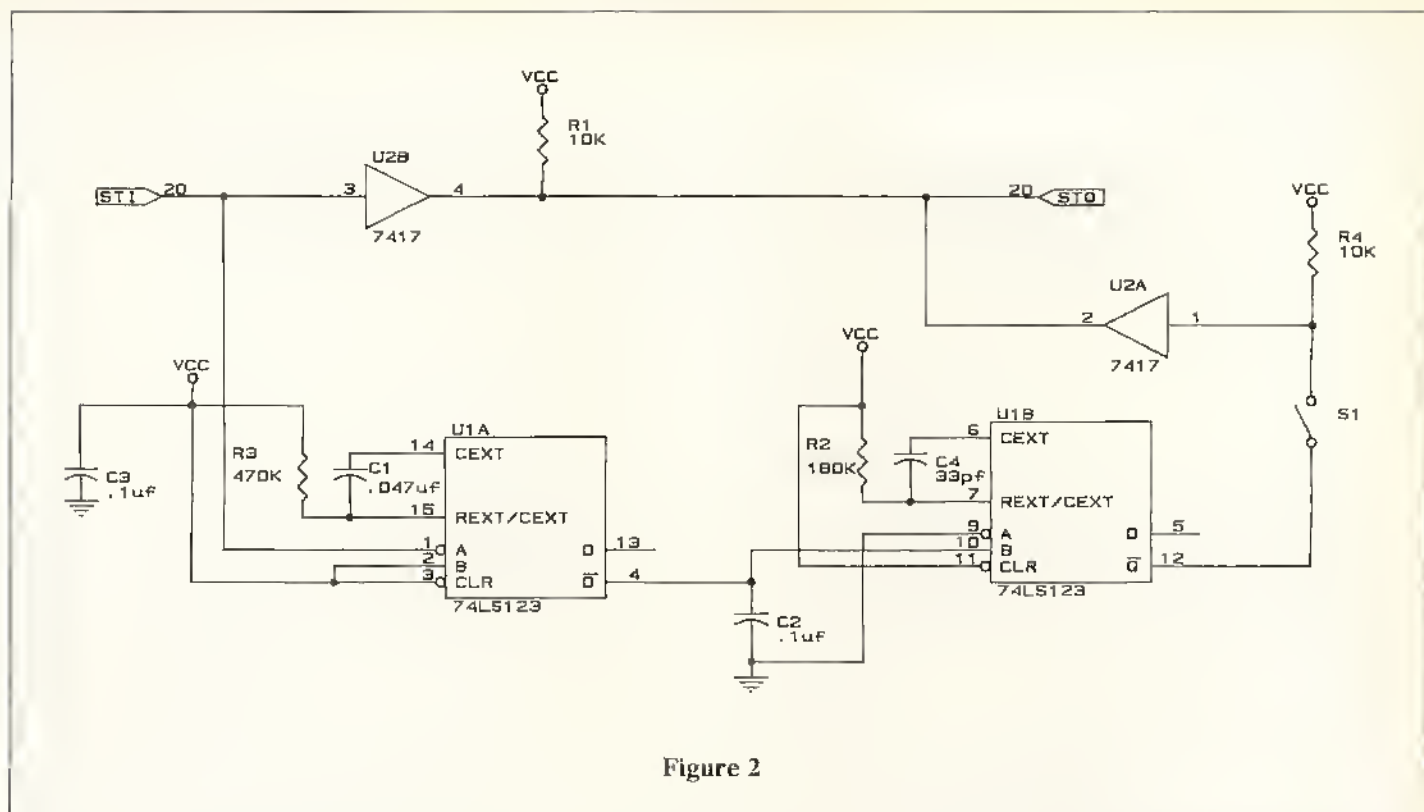


Figure 2

possible for an 80-track drive to read a standard 40-track disk. After a few experiments I came up with a doubling circuit. For every step pulse coming into the drive, two pulses come out.

When stepping a standard 40-track drive, the CoCo's controller waits a minimum of 6ms between steps. For an 80-track drive with a 3ms step rate, this is relatively slow. In fact, it can step twice as fast, so the circuit has time to step between steps.

Examine the circuit in Figure 2 used to make the double stepper. It consists of two TTL chips and a handful of passive components.

First it takes one pulse that comes in and changes it into two pulses. U2B acts as a buffer so that the second pulse doesn't trigger the circuit into oscillation. U1 is a dual monostable multitrigger. The first part (U1A) is used as a delay. The pulses that come in on ST1 are very short and are coming in at every 6ms. I say short because they are short compared to the circuit's delay of 3ms between pulses. That is half the time between incoming pulses. (Remember that an 80-track drive can step every 3ms.) When a pulse enters into the A input of U1A, Q* (Pin 4) goes low and stays low for 3ms. Nothing happens until Q* goes high again. The B input of U1B circuit starts on the rising edge of Q*. When this pin gets a rising edge, it starts timing a much shorter pulse, about 4μs,

the same pulse length as the incoming step pulse.

Now let's look at what happens to the STO point in the circuit. The first (original) pulse happens; STO sees one pulse; that triggers a pulse at U1A; about three milli-seconds later, a pulse triggers U1B. If the switch S1 is closed, the short pulse generated by U1B (4μs) goes through U2A and appears at STO. At that point the drive gets a second pulse to step. If S1 is opened, the pulse goes nowhere.

Construction for this project is not difficult. Besides parts, it requires opening your drive case and modifying the drive, which takes some electronic skills and should be done only by someone with experience in soldering and circuit modifying.

Concerning parts, look at the circuit in Figure 2. These are all the parts you need — four resistors, four capacitors, two chips and one switch. You'll need a small proto-board on which to mount all the parts. These are available at any Radio Shack store, unlike some of the other parts.

Connect all the pins to the chips; unmentioned pin numbers should be left unconnected. Pin 16 of U1 and Pin 14 of U2 should be connected to +5 volts. Pin 8 of U1 and Pin 7 of U2 should be connected to the ground. After all the components are mounted on the small board, it's time to mount the whole thing into your drive. I

can only give you guidelines since the great variety of 80-track drives makes it difficult to be exact.

First you need to find a place to fit the board — once fitted, you have to connect 5 volts and ground. A voltmeter here is handy but not necessary. Locate the power connector to the drive. There are 5 volts, 12 volts and ground at the connector. Pin 4 is 5 volts and pins 2 and 3 are ground. The next step is to find the 34-pin edge connector. Locate Finger 20 and a convenient location, then cut the trace that leads to it. Solder the connection labeled ST1 to the side of the cut that leads to the finger, and solder another connection labeled STO to the other side of the cut. Mount the switch somewhere on or near the front of the drive, then reassemble the drive assembly and turn everything on.

Now insert a 40-track disk in the 80-track drive, turn the switch on, and type DIR. If it's not working, check your work; if you have a digital probe, use it.

Now that you have the circuit working, you need to know how to use it. While in OS-9, leave the switch off. This allows you to access all 80 tracks. (You must use the 80-track descriptor.) When you want to read standard 40-track disks, turn the switch on, use a 40-track descriptor and read the disk. Do not try to write on a 40-track disk with an 80-track drive. It will not work properly.



Economy Printer Buffer

Part 1 of 2

By Harleen Francisco

Listing or sending data to a printer can be a time-consuming task, while the computer is forced to slow down because its rate of operation is tied to the through-put of the associated printer. Waiting for such a system can be a frustrating experience. The Economy Printer Buffer solves this problem. It appears as a high-speed printer to the host computer, taking data as fast as it is supplied and passing that data to the associated printer as it is required. Your computer will not waste its valuable time printing but will be available for its primary purpose — computing!

Features

As shown in the schematic (See Figure 1.), the heart of the Economy Printer Buffer is a 6803 eight-bit microprocessor. The 6803 has built-in peripheral functions: A serial interface, a 16-bit timer and Input/Output lines. These functions allow us to build a very compact system.

Storage capacity is 64K bytes of memory (eight 4164-type dynamic RAMs). Two types of interfaces are selectable: parallel to parallel, or serial to parallel. The serial to parallel interface may be set up in one of two different ways: internal (9600 baud using the internal 6803 clock) or external (150, 300, 600, 1200, 2400, 4800 or 9600 baud). These external baud rates are produced by dividing the E clock and feeding that clock back into the 6803 at Pin 10 (P22).

Two LEDs are provided to indicate status: one for Full/Busy and one for Error/Dupe. Two switch-functions are provided for control input to the buffer: one for reset, the other for obtaining a duplicate output of the

buffer storage.

The use of special counters, SAMs, or one-shots for memory refresh are unnecessary; refresh of the dynamic memory is accomplished by the system software. The software refresh is transparent to the operation of the buffer.

Interfaces

Parallel (centronics type) interfaces are accomplished by a Peripheral Interface Adapter (PIA). The cables used for these interfaces may be up to six feet.

The serial interface uses the full-duplex Serial Communications Interface (SCI) within the 6803 microprocessor. This interface operates using a standard form. Each character-set consists of one start-bit, eight data-bits and one stop-bit. The 9600 baud rate uses the internal timer of the 6803 for its clock source. If any other baud rates are desired, an external baud clock must be used. This arrangement is illustrated in Figure 2.

The correct baud rate frequencies require that a 4.9152 MHz crystal be used. This results in a clock rate of 1.2288 MHz at the microprocessor. A clock rate greater than 1.0 MHz requires 6803-1; however, I have used normal 6803's with no problems. If you already have a 6803, try it.

Hardware

All members of the 6803 family have a multiplexed address/data bus when in their expanded mode. Address lines A0 to 7 are multiplexed with the data lines D0 to 7 on Port 3. An address-strobe pulse occurs during the low phase of Enable-Sign E. The address is guaranteed to be valid on Port 3 only during the falling edge of AS, at which time it is frozen by an LS373 latch IC. Address lines A8 to 15, produced by Port 4, are not multiplexed and are valid throughout most of the Enable cycle.

During the E-clock high phase, Port 3 either presents data for writing, or expects to see data for reading. Read/Write line R/

W should be lowered only during the positive E phase to prevent erroneous writing. Data is read by the processor during the E-signal falling edge. As with all multiplexed bus systems, care must be taken to ensure that all device output buffers are disabled during the E-signal low phase; otherwise bus contention will result. After having obtained essentially separate address and data buses, connection of the 2716 EPROM and 6821 PIA is easy.

Memory decoding is arranged to keep as much of the 64K byte address space as possible free for buffer RAM, while using a minimum of ICs. As the software is less than 1K byte long, only half of the 2716 is used, but Address-Line A10 is tied high through a 2K resistor.

Most systems using dynamic RAMs have RAM controllers to generate timing signals and to refresh the memory independently. These controllers tend to be costly, but, as their performance is not essential in this application, I chose to use a software technique (described later). As a bonus, the hardware required to implement this is minimal.

To reduce the number of pins used on the 64K byte dynamic RAMs, address lines A0 to 7 are multiplexed with lines A8 to 15 using two signals, called Row-Address Strobe (RAS) and Column-Address Strobe (CAS). The address bus is multiplexed with the E-signal using two LS157 quad two-to-one line multiplexers. The timing allows it to be used directly as RAS during the E-signal low phase.

Generating CAS is a little more difficult. When the RAM is accessed, the RAM E-signal is clocked through two D-type latches by the microprocessor input clock. The E-signal is derived from the processor clock and is one quarter of its frequency. The D-type devices are, however, held clear during the E-signal low phase (while CAS is held high). In order to meet data setup times for the processor and RAMs, CAS is also conditioned by the R/W signal.

Harleen Francisco is a pediatric nurse who enjoys working with children. Her hobbies include music, horseback riding and computers. Harleen, together with her husband, Gene, design and develop computer peripherals.

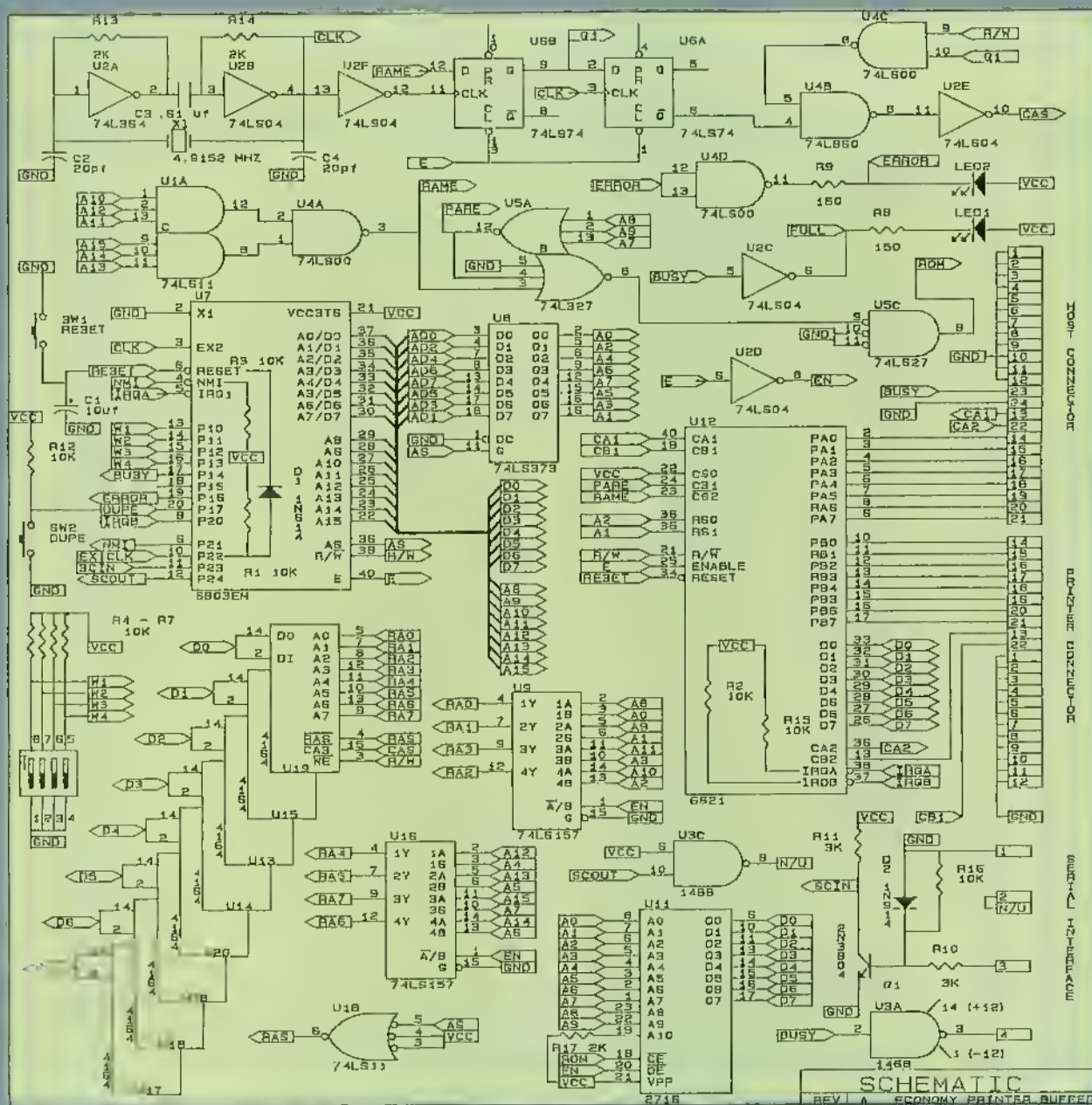


Figure 1: Schematic

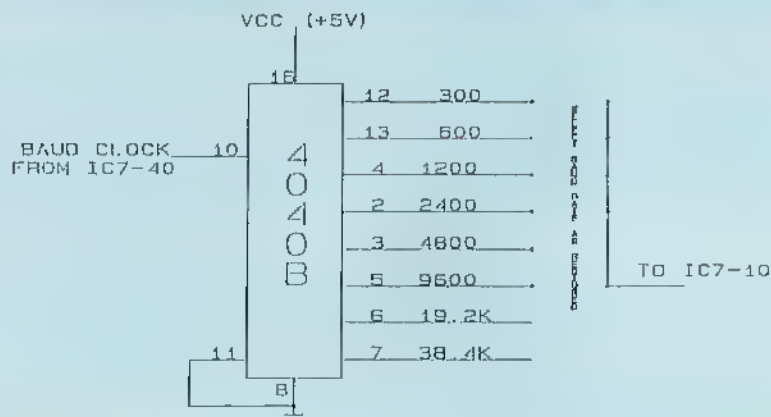


Figure 2: External baud clock

Hence, CAS will fall only if RAME is true, and if during the high E phase the latches have been clocked twice for a write and only once for a read.

Modular Software

The software is interrupt-driven and consists of five modules: initialization, parallel data in, parallel data out, serial data in and RAM refresh.

During initialization, a vector jump-table is set up in the scratch-pad RAM for Interrupt Request (IRQ) and Software Interrupt (SWI) instructions. The jump address inserted depends on the operating mode. Interrupt vectors for IRQ and SWI point to the jump-table and can, therefore, indirectly enter the appropriate handling routine without the need to poll the interrupt sources.

Interrupt-handling software for parallel data-input is entered following a positive edge on the Host Data-Strobe Signal (HDS). Similarly, the Data-Output Handler is entered following a positive edge on the printer acknowledge signal (HACK).

The first printer data-strobe (output) is forced by executing a Software Interrupt instruction (SWI). This instruction in the vector jump-table will have been set to point to the parallel output service routine during initialization. Although the SWI instruction is essentially intended for use by in-circuit emulators (for example, in break-point generation), it is an elegant way to force an interrupt. Note that SWI is not maskable.

Further printer data-strobe pulses are generated automatically as the subsequent printer-acknowledge signal causes the data-output handler to be re-entered. The next byte to be sent is then written into the PIA, and a further data-strobe pulse is generated by the on-board handshake logic.

Similarly, acknowledge pulses to the host are also generated automatically whenever the input PIA port is read.

If the buffer becomes full, the Busy line is asserted and the buffer-full LED lights. Acknowledgement for the last character strobed is not sent before space for the data becomes available. The Busy line is cleared before sending the acknowledgment.

Serial data transfer is performed in a way similar to parallel data transfer (apart from the handshaking and buffer-status differences).

Simple Code

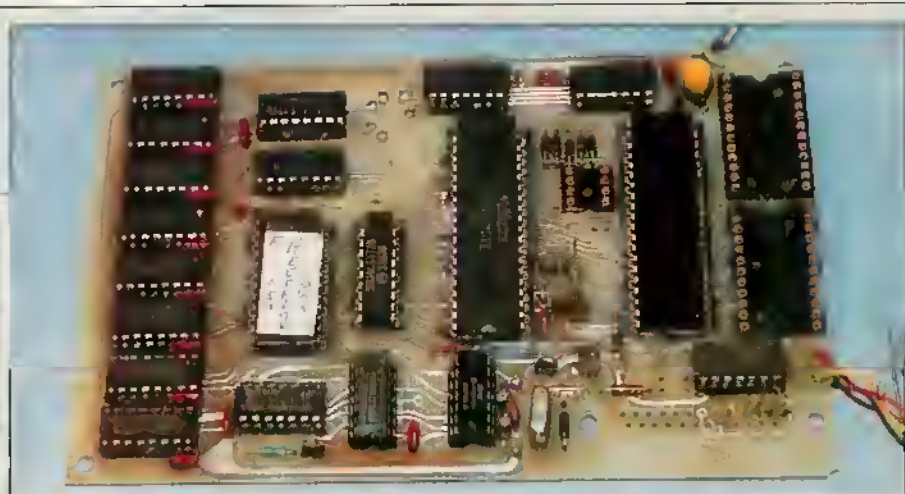
Much of the buffer software is straightforward, as seen from the sample listing (See Figure 3). The two address pointers are BUFIN and BUFOUT. After checking that the buffer is not already full, the program reads the PIA, which causes an acknowl-

```

04570 **
04580 **      IRQ1 : PIA INTERRUPT HANDLER IRQA
04590 **      (HOST INTERFACE)
04600 **      ENTERED DUE TO DATA STROBE +VE EDGE
04610 **
04620 **      EMPTST : ENTRY POINT FROM SCIIIN
04630 **
04640
04650 *IRQ1    LDX      BUFIN      6803
04657 IRQ1    LDA      PORT1
04658        ORA      #BFULL1
04659        STA      PORT1
04660        LDU      BUFIN
04670        CMPX     BUFOUT    CHECK IF FULL
04680        BNE      NOTFUL
04720        LDA      #$2E      DISABLE IRQA
04730        STA      CONA
04740        BRA      QUIT
04747 NOTFUL  LDA      PORT1
04748        ANDA     #BFULL0
04749        STA      PORT1
04750        LDA      REGA
04760        STA      0,X
04770        JSR      LIMIT
04780
04790 *        STX      BUFIN      6803
04800        STU      BUFIN
04810
04820 EMPTST    LDA      FLAG
04830        BEQ      QUIT
04840        CLR      >FLAG
04850        LDA      MODE
04860        BEQ      QUIT
04870        SWI
04880 QUIT      RTI
04890
04900 **

```

Figure 3: Sample buffer code



This photo shows the completed project (circuit board with parts) without the case.

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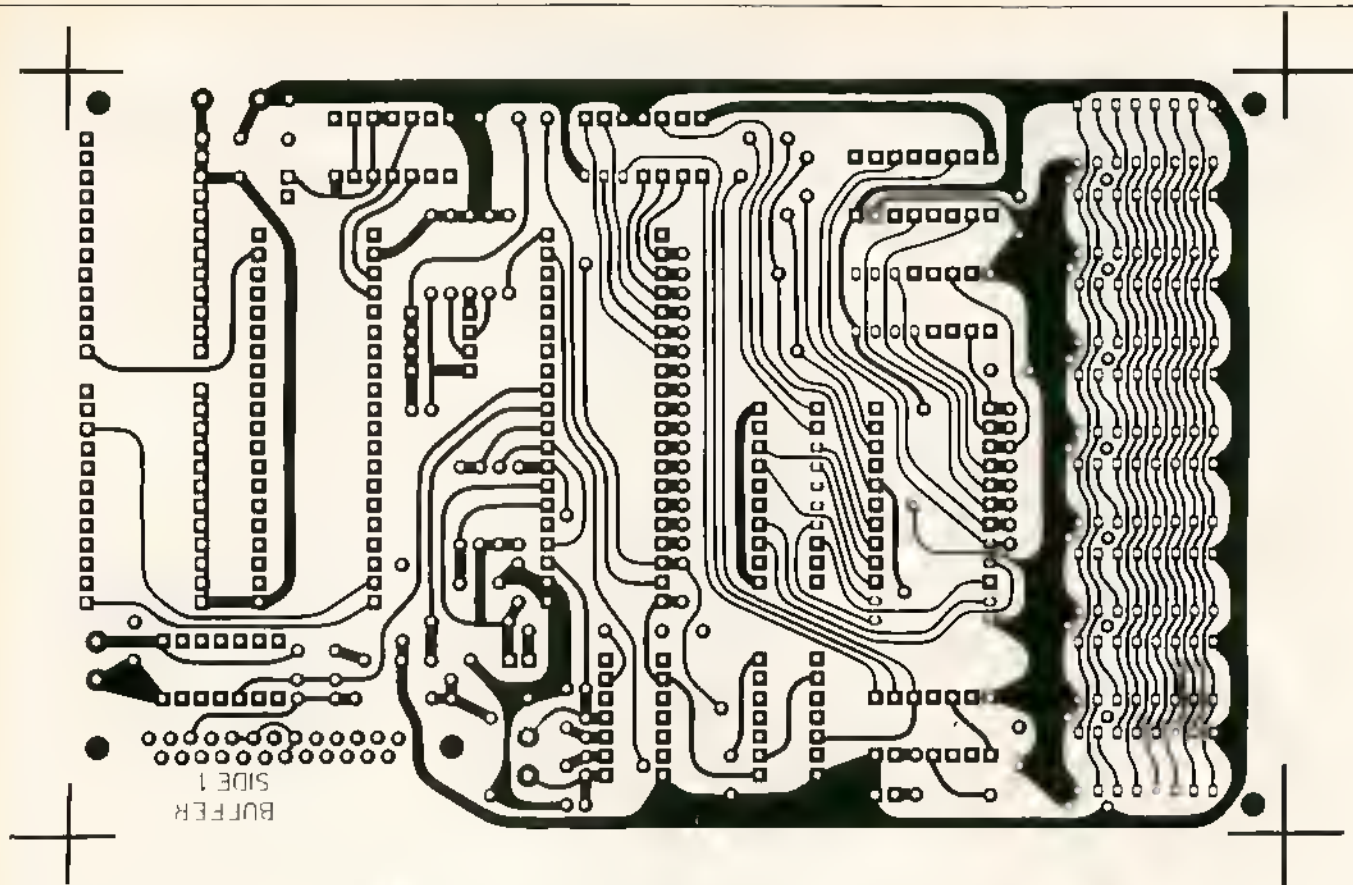


Figure 4: Front side of circuit board (shown actual size).

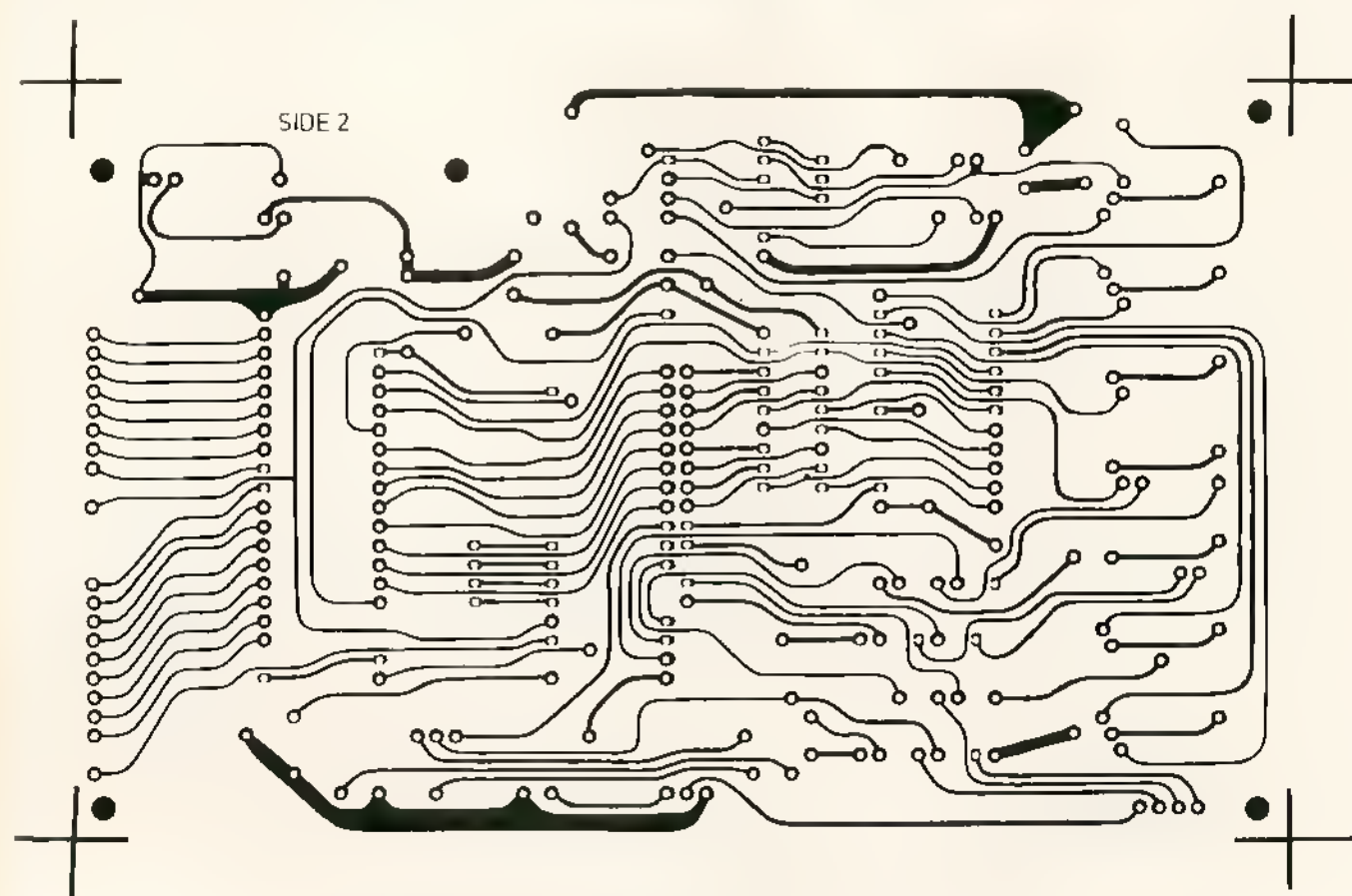
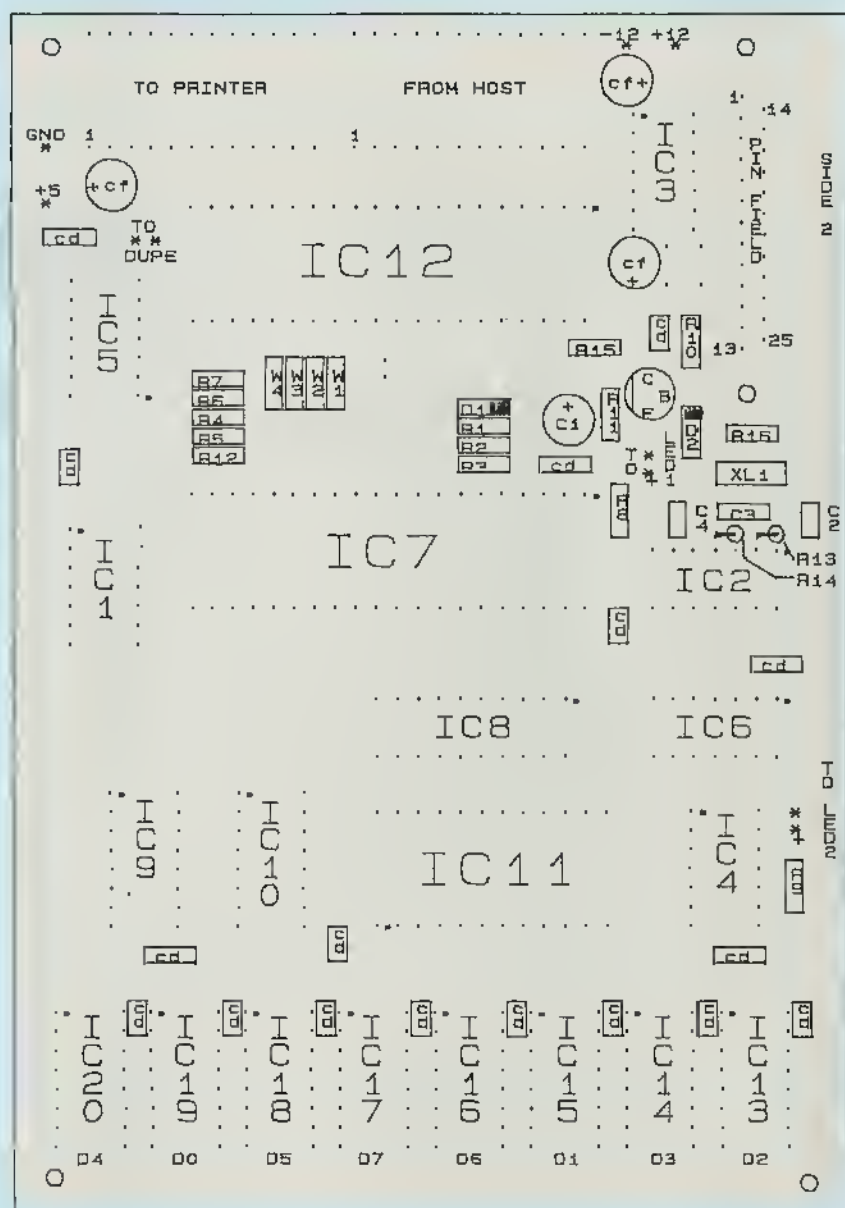


Figure 5: Backside of circuit board (shown actual size).



R1 - R7	10K OHMS	C1	10 uF
R8 - R9	150 OHMS	C2 - C4	20 pF
R10 - R11	3K OHMS	C1	.01 uF
R12	10K OHMS	Cd	100 uF
R13 - R14	2K OHMS	Cd	.1 uF
R15 - R16	2K OHMS	Q1	2N3904
R17	2K OHMS	IC1	74LS11
D1 - D2	1N914	IC2	74LS04
XL1	4.9152 MHZ	IC3	MCM148B

IC4	74LS00
IC5	74LS27
IC6	74LS74
IC7	6803-1
IC8	74LS373
IC9 - IC10	74LS157
IC11	MCM2716
IC12	68A21
IC13 - IC20	4164

Figure 6: Parts placement and parts list.

edge strobe and stores the acquired data. After being incremented the input pointer BUFIN is checked to ensure that it remains within the circular-buffer address range by calling subroutine LIMITAS shown in the sample listing.

Buffer-status byte FLAG is next tested to check whether or not the buffer was previously empty. If so, FLAG is cleared and this forces execution of the printer interface interrupt-handler through an SWI instruction. This restarts the DS/ACK handshake after the buffer becomes empty.

Hidden Benefits

A large part of the actual code (See the listing on Page 108.) is common to both serial and parallel communication.

Refreshing of the dynamic RAM is carried out by software, executing a string of no-operation (BRN) every 2ms. This increments the address bus 256 times, which ensures that every column is refreshed through an RAS-only refresh at least once in 2ms.

An output-compare feature on the MC6803 processor is used to generate the periodic 2ms interrupt. The on-chip timer is a free-running incrementing counter which has an associated output-compare register. When the content of this compare register is equal to that of the counter, an interrupt can occur.

In this system, it is standard that during execution of each RAM refresh module the output-compare register is loaded with the value of the timer plus 2ms. Port P21 is set up to fall when this time elapses, pulling the Non-Maskable Interrupt (NMI) low and causing the RAM refresh handler to be re-entered.

Interrupt Priority, as the normal output-compare function, was considered too low for the RAM refresh module. Using Port P21 to activate NMI effectively has moved this Interrupt Priority to the highest position, apart from Reset. For my technique the software execution overhead is about 12 percent, but in this application that is of no real consequence.

We will continue next time with construction and troubleshooting. In the meantime, however, you can start constructing a printed circuit board (See Figures 4 and 5.) and gathering parts (See Figure 6.).

[The printed circuit board (a double-sided board) is available for \$25 from the author at the address below. Also available is the programmed EPROM for \$10.]

(Questions or comments concerning this project may be addressed to the author at 8332 Peggy Street, Tampa, FL 33615. Please include an SASE when requesting a reply.)

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PLEASE CIRCLE
 TAPE or DISK

✓	1007	28
	1016	173
	1025	145
	1034	205
	1044	65
	1050	188
	1062	.....	100
	END	.....	174

The Listing: HECONOMY

```

10 REM HECONOMY
20 REM START ADDRESS 18432(4800)
30 REM END ADDRESS 20479(4FFF)
40 FOR X=18432 TO 20479
50 READ A$
60 A$="&H"+A$
70 POKE X,VAL(A$)
80 NEXT X
1000 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
1001 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
1002 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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1003 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
1004 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
1005 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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1006 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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1007 DATA FF,FF,FF,FF,FF,FF,FF,F
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1008 DATA FF,FF,FF,FF,FF,FF,FF,F
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1009 DATA FF,FF,FF,FF,FF,FF,FF,F
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1010 DATA FF,FF,FF,FF,FF,FF,FF,F
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1011 DATA FF,FF,FF,FF,FF,FF,FF,F
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1012 DATA FF,FF,FF,FF,FF,FF,FF,F
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1013 DATA FF,FF,FF,FF,FF,FF,FF,F
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1014 DATA FF,FF,FF,FF,FF,FF,FF,F
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1015 DATA FF,FF,FF,FF,FF,FF,FF,F
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1016 DATA FF,FF,FF,FF,FF,FF,FF,F
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1017 DATA FF,FF,FF,FF,FF,FF,FF,F
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1018 DATA FF,FF,FF,FF,FF,FF,FF,F
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1019 DATA FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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1020 DATA FF,FF,FF,FF,FF,FF,FF,F
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1021 DATA FF,FF,FF,FF,FF,FF,FF,F
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1024 DATA FF,FF,FF,FF,FF,FF,FF,F
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1025 DATA FF,FF,FF,FF,FF,FF,FF,F
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1028 DATA FF,FF,FF,FF,FF,FF,FF,F
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1029 DATA FF,FF,FF,FF,FF,FF,FF,F
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1030 DATA FF,FF,FF,FF,FF,FF,FF,F
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1032 DATA FF,FF,FF,FF,FF,FF,FF,F
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 FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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 FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,
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 1040 DATA FF,FF,FF,FF,FF,FF,FF,F
 F,8E,00,4F,86,20,97,02,86,50,97,
 00,86,12,97,03,97,01,86,10,97,08
 1041 DATA CC,09,97,DD,0B,86,FF,B
 7,FC,02,86,3E,B7,FC,01,B7,FC,03,
 86,2E,B7,FC,01,B7,FC,03,BD,FD,7E
 1042 DATA 86,7E,97,23,97,20,CE,F
 E,74,DF,21,FE,FE,D0,DF,24,D6,02,
 C4,0C,54,54,D7,2F,26,02,8D,72,5A
 1043 DATA 26,0A,8D,6D,86,2F,B7,F
 C,03,01,01,01,5A,26,07,8D,71,86,
 2F,B7,FC,01,5A,26,0A,86,2F,B7,FC
 1044 DATA 01,B7,FC,03,01,01,5F,C
 E,FC,80,3A,A6,00,CE,00,50,3A,A7,
 00,5C,81,04,26,EF,DF,2A,CC,FB,FF
 1045 DATA DD,26,DD,2C,7F,00,2E,0
 E,96,2F,26,1A,8D,29,96,02,44,25,
 FB,8D,16,8D,4E,8D,2F,8D,57,24,F6
 1046 DATA 96,02,44,24,F7,8D,41,2
 0,E6,3F,8D,49,20,FC,86,05,CE,00,
 00,09,26,FD,4A,26,F7,39,CE,FD,C7
 1047 DATA DF,24,96,11,96,12,86,1
 A,97,11,20,11,20,0F,CE,FE,50,DF,
 24,DF,21,96,11,86,0E,97,11,86,FF
 1048 DATA 97,13,39,FF,FF,FF,FF,F
 F,FF,FF,FF,FF,FF,FF,C6,05,96,02,
 84,02,26,02,CB,08,D7,10,39,96,02
 1049 DATA 0D,2B,2C,DE,26,8D,29,D
 F,2A,01,01,86,AA,97,2E,8D,A6,96,
 02,2B,16,CC,00,4F,DD,26,96,02,8A
 1050 DATA 40,97,02,2A,F8,BD,FD,4
 4,96,2F,27,01,3F,0C,84,AF,97,02,
 39,08,8C,FC,00,25,03,CE,00,50,39
 1051 DATA D6,11,96,12,DE,2A,9C,2

6,26,04,C6,40,20,06,A7,00,8D,E4,
 DF,2A,58,2A,06,D6,02,CA,40,D7,02
 1052 DATA 96,02,85,10,26,34,DC,2
 A,C3,10,00,9C,26,25,0E,83,FB,FF,
 23,26,C3,00,50,93,26,23,1F,20,04
 1053 DATA 93,26,23,19,21,FE,21,F
 C,8A,10,97,02,DC,26,C3,00,FF,DD,
 28,83,FB,FF,23,05,C3,00,50,DD,28
 1054 DATA 20,23,96,02,8A,10,97,0
 2,DE,2A,9C,26,26,07,86,2E,B7,FC,
 01,20,1C,96,02,84,EF,97,02,B6,FC
 1055 DATA 00,A7,00,BD,FD,BD,DF,2
 A,96,2E,27,08,7F,00,2E,96,2F,27,
 01,3F,3B,96,11,85,80,27,1C,96,12
 1056 DATA 81,13,26,16,86,0A,97,1
 1,0E,96,11,85,80,27,FA,96,12,81,
 11,26,F4,0F,86,0E,97,11,20,07,B6
 1057 DATA FC,02,96,08,96,0D,DE,2
 6,BD,FD,BD,DF,26,9C,2A,26,0F,09,
 DF,26,96,2F,26,04,86,0A,97,11,97
 1058 DATA 2E,20,38,A6,00,B7,FC,0
 2,D6,2F,54,21,02,97,13,96,02,85,
 10,27,26,54,25,0C,DE,28,9C,26,22
 1059 DATA 1D,20,15,20,13,20,11,B
 6,FC,00,DE,2A,A7,00,BD,FD,BD,DF,
 2A,86,2F,B7,FC,01,96,02,84,EF,97
 1060 DATA 02,BD,FD,8B,3B,86,11,9
 7,08,DC,09,C3,00,20,DD,0B,01,21,
 6E,21,6C,21,6A,21,68,21,66,21,64
 1061 DATA 21,62,21,60,21,5E,21,5
 C,21,5A,21,58,21,56,21,54,21,52,
 21,50,21,4E,21,4C,21,4A,21,48,21
 1062 DATA 46,21,44,21,42,21,40,2
 1,3E,21,3C,21,3A,21,38,21,36,21,
 34,21,32,21,30,21,2E,21,2C,21,2A
 1063 DATA 21,28,21,26,21,24,21,2
 2,21,20,21,1E,21,1C,21,1A,21,18,
 21,16,21,14,21,12,21,10,21,0E,21
 1064 DATA 0C,21,0A,21,08,21,06,2
 1,04,21,02,21,00,21,FE,21,FC,21,
 FA,21,F8,21,F6,21,F4,21,F2,21,F0
 1065 DATA 21,EE,21,EC,21,EA,21,E
 8,21,E6,21,E4,21,E2,21,E0,21,DE,
 21,DC,21,DA,21,D8,21,D6,21,D4,21
 1066 DATA D2,21,D0,21,CE,21,CC,2
 1,CA,21,C8,21,C6,21,C4,21,C2,21,
 C0,21,BE,21,BC,21,BA,21,B8,21,B6
 1067 DATA 21,B4,21,B2,21,B0,21,A
 E,21,AC,21,AA,21,A8,21,A6,21,A4,
 21,A2,21,A0,21,9E,21,9C,21,9A,21
 1068 DATA 98,21,96,21,94,21,92,2
 1,90,21,8E,21,8C,21,8A,21,88,21,
 86,21,84,C3,09,9A,DD,0B,86,10,97
 1069 DATA 08,3B,FF,FF,FF,FF,FF,F
 F,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,
 FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,
 1070 DATA FF,FF,00,23,FC,90,FC,9
 0,FE,74,FE,20,00,20,FE,D1,FC,90

A program for keeping softball statistics

FunStats

By Delbert Baker



For some time now it has been my opinion that the Color Computer can do just about anything the larger, more powerful and much more expensive computers can do. It just takes a little more time and perhaps a few more tedious tasks such as disk and program swapping. Thanks to its powerful BASIC, it does some things

Recently, I decided to use the CoCo to keep statistics on my softball team. I shopped for statistics programs but found most were for serious statistics. We play softball for fun and keep our statistics for fun too. So I wrote *FunStats*. I used it to keep the offensive statistics for our softball team, the Buffaloes, last season. It was not entirely fun writing and debugging the program, but it was enjoyable to pass out stat sheets to everyone.

FunStats is not just one but several programs. I started out making it just one program, but it kept growing until there wasn't enough memory for efficient string manipulations, of which it has many.

The basic functions are covered by the programs, FUNSTATS (Listing 1) and RSTRMKR (Listing 2). The other programs accomplish special or unusual functions.

RSTRMKR (*RoSteRMaKeR*) is used at the start of the season to set up the roster as a direct-access file containing the players' full names, addresses, phone numbers and cumulative statistics. It is a direct-access file because after each game is entered, the cumulative statistics are updated.

FUNSTATS is the real workhorse of the group. It is used to enter the individual game files, print or display the statistics for a single game or the totals-to-date, and print or display the roster entries. The game entry module does several things: prompts you for the individual performance data, calculates the averages, stores the data and averages for a game in a sequential file, updates the performance totals, recalculates the total averages, and restores the

total data and averages in the roster file.

The display module prompts you for a game file or totals-to-date display. It then reads the necessary file and prints it to the screen. The print module prompts you again for a game file or totals-to-date. It then reads the necessary file and prints a report with an abbreviated name and all the proper statistics. The roster review module prints the full name, address and phone number of each player to the screen.

An accessory program, COPYFILE (Listing 6), can be used to keep a backup copy of your data disk on a one-drive system. The program prompts you first to choose a roster file or a game file to copy. If you choose to copy a game file, it then prompts you for a game number if necessary. The proper file is read into an array and you are prompted to place the destination disk in the drive. It then stores the chosen file on the new disk. (A note to JDOS and other enhanced-DOS users: You don't need COPYFILE and all the other programs to work as well in JDOS as Disk BASIC.

Another accessory program, RSTRFXR (Listing 3), or *RoSteRFiXeR*, recalculates the totals for the roster file. While entering a game file, I made a mistake and did not discover it in time to correct it. The first time I used it, I realized that I could use these same features in a program to prepare special files or reports for perhaps a week-end tournament or a particular month. So I rewrote it to include the special file and report printing routines. I'll say more about this later.

Using the Roster Maker

After you have RSTRMKR typed in, saved to disk and loaded into memory, there are a few things to do before using it. First, go to Line 160 and change C1\$ and C2\$ to the city names you will be using, remembering to limit the city, state and ZIP entry to no more than 20 characters. C1\$ and C2\$ are simply shortcuts so that the same city name does not have to be typed many times. If you wish, you can eliminate their use entirely by deleting lines 160 and 270, and deleting 12 INPUT from Line 260 so the program responds only to a string input. You may also add more cities by defining more strings, adding to the prompt on Line 260, and

adding an ELSE IF statement to Line 270 for each new city string.

For optional changes, the program is DIMensioned to allow a maximum roster of 20 players. (Our local city softball league allows only 20 players on a roster.) If you need a longer roster, change all the DIMension statements to reflect the number you need. (Notice that all these programs are DIMensioned the same, so any change in one program should be repeated in any other program used.) If you are going to keep the statistics for more than one team, you may want to change the word ROSTER in Line 190 to identify the team. Again, notice that all the programs use the same conventions in calling the roster file so that any change in one program must be repeated in the other programs. And finally, if you do not want your roster sorted (for instance, to keep your roster in accord with the basic batting order), you can delete the sort without harm to the operation of the program. To do this, delete lines 310 to 390 and the PRINT@12 "SORTING" statement from Line 300.

Now save your customized version to a working disk and a backup disk, then type RUN and start using it.

You are first asked for the season. The program uses the last two characters you enter added to the word ROSTER to form F1\$, which is then used to name the roster file. (The roster file is called using F1\$ and uses Buffer 2 in these programs.)

Next, you are prompted for player information — the player's first and last name, address, city, state, ZIP and phone number. There is room for 24 characters of first and last name; 30 characters of address; 20 characters of city, state and ZIP code; and eight characters (including the hyphen) of the phone number.

When finished entering players, type STOP and press ENTER to end the session and move on to the sort. STOP must be typed in capital letters because there is a programmed SNIFF-0 when entering players so that lowercase letters can be used in the printout.

Next, you are prompted to select the screen or disk for output or to quit. Selecting the screen produces a three-at-a-time display of player information just entered and then returns you to the prompt when

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finished. Selecting Disk stores the roster file on the working disk and again on the backup disk. Finally, selecting Quit closes the file and exits to BASIC.

Now you are ready to go on to FUNSTATS.

Using FunStats

Once FUNSTATS is in memory, go to lines 1080, 1090, 5040 and 5050 and change the word BUFFALOES to your own team name. The team name is part of the program so you don't have to type it in every time you enter a game. It is not stored with any of the disk files.

Next, if you changed the word ROSTER in RSTRMCR, go to Line 280 and change the word ROSTER to the same thing. If you don't, the program will go looking for a file called ROSTER — and won't find it. If you changed the DIM statements in RSTRMCR, go to lines 170 to 240 and change those DIM statements also. For the two DIMENSIONAL arrays, the first is the number of players, the second is the number of statistics entries for each player. U, SU\$ and SA\$ are temporary variables used in the program and are DIMENSIONED to match the number of statistics entries.

Save your customized program to both a working and backup disk. Type RUN and press ENTER. Now we'll go into actually using FUNSTATS, module by module.

The first FUNSTATS module is the game entry module, reached by selecting 1 from the menu. The screen is cleared and you are asked for a game number, the name of the opposing team, whether your team is the home team or not, the number of runs scored by each team, and the game date. The game number and the last two characters of the game date are added to GN to name the file in which the data for the game is kept. The game number can go as high as 9999 and still leave enough room to make a valid file name. Once this data is entered, the file is opened and the data recorded. The program then moves to the entry of the actual player performance data.

The player data entry section uses the abbreviated name strings found when the program was started. These appear on the screen one by one along with prompts for the individual data items. The first prompt you see asks if this player played in this game. A "yes" answer moves you on through the prompts in a normal manner for data entry. A "no" answer enters a zero value for all data and calculation items and moves you on to the next player. Now on to data prompts.

The first prompt is AT BATS (not OFFICIAL AT BATS). The program uses it as plate appearances and makes corrections to it for the calculations. The next prompt, RUNS,

tells how many times a player has scored, while HITS (in our league), records a hit anytime a runner gets on base without a walk. (See the end of this section to find out how to account for errors and fielders choice entries.) The remaining prompts are WALKS, followed by DOUBLES, TRIPLES, HOMERS and SACS (sacrifice flies). They are self-explanatory. RBI records the runs batted in, while TIMES ENDED INNING is a source of curiosity. We keep this statistic because errors and fielders' choices are ignored in our league.

That completes the entered data items. The final three statistics are calculated items: the batting, on base and slugging average.

Since we don't keep any data on errors and fielders' choices, none of these calculations take them into account. The batting average is the number of hits divided by the quantity derived from subtracting the number of walks and number of sacrifices from the number of plate appearances. The on-base average is the number of hits plus number of walks divided by the number of plate appearances minus number of sacrifices. The slugging average is the average number of bases gained per hit, calculated by adding the number of hits, doubles, twice the number of triples, and three times the number of homers together and dividing the result by the number of hits. This yields a slugging average between one and four.

That completes the statistics items for an individual player. At this point the player's abbreviated name string, indicating whether a player played in the game, and a string composed of the individual statistics is written into the game file. The program then updates the total stats string in the roster file and restores it there, then goes on to the next player. The program keeps a count of the players and automatically exits the entry section when it runs out of them.

Occasionally while entering data, the program seems to hang up. However, it is just cleaning up its string-handling overhead and will be back momentarily.

Now let's talk about keeping track of errors and fielders' choices for those of you who are more serious than we are. The easiest way to keep track of them is to combine them into one data item (for example, E&FC) and to substitute that item for the ended innings (EI) item. It is then a simple matter to edit the calculations on lines 1190 to 1210 and 1330 to 1350 to reflect their use if desired. Of course you can keep track of them without using them in your calculations. This way your averages seem higher too.

Another way to keep track of errors and fielders' choices is to keep them as separate data items. This is more difficult unless you

don't mind wasting half a sector on each roster file entry by using it to store three bytes.

The roster file is set up to use 128 bytes for each record, or half of a sector. To maintain this and add the necessary variables, I suggest using the ended innings variable for one and create another by snatching three bytes from the name and address fields. This increases the number of statistics kept on each player from thirteen to fourteen. You must reDIMENSION those arrays that include the statistics entries.

Then go to lines 1190 to 1210 and lines 1330 to 1350 and alter the calculations to your satisfaction. Lines 1220 to 1290 and lines 1360 to 1430 must be reworked to concatenate all the data items into a single string. Don't forget to edit the FIELD statements on lines 1075 and 6020 and on Line 520 of RSTRMCR.

I chose to assemble the individual stats into one long string for the disk files because I dreaded the idea of thirteen separate CVN statements, followed by 17 separate LSET statements, to build the file. As it turned out, it probably would have been easier.

This completes the discussion of the game entry module of FUNSTATS. The rest of the program is much simpler and straightforward.

The second FUNSTATS module is the game or totals display reached by selecting 2 from the main menu. When selected, the screen is cleared and you are prompted to choose whether you want to see a game file, the totals-to-date, or return to the main menu. If you choose to view a game, you are then prompted to enter a game number. The proper game file is then read into the computer and the statistics displayed, player by player, on the screen in a format very similar to the input screen.

If you choose to view the totals-to-date, the screen is cleared and you are prompted to enter the date. Entering the date is optional and you may simply press ENTER. The statistics are then displayed, player by player, on the screen, again in a format similar to the input screen. Finally, if you choose the main menu, it is whisked back onto the screen.

The third FUNSTATS module is the report-printing routine, reached by selecting 3 from the main menu. When selected, the screen is cleared and you are prompted to choose a game report, a statistics-to-date report, a roster listing, or to return to the main menu. If you choose to print a game report, the screen is cleared and you are prompted for a game number. The entered game number is then checked in memory and if not there, the proper game file is read into the computer. You are then prompted

to make sure the printer is on and the paper positioned. The report is headed by the game number, the home team and visiting team's score, and the date the game was played. Then a label header is printed, followed by the individual players' abbreviated name strings and statistics entries.

If you choose to print a statistics-to-date report, the screen is cleared and you are prompted for a date. The date is optional but highly recommended. You are then prompted to check that the printer is on and paper positioned. The report is labeled as a totals report and the rest printed in the same format as the game report. Our team had thirteen players, and I found it possible to put two game reports and a totals report on one page.

When printing a roster listing, the screen is cleared and you are prompted again to check the printer and paper. A simple listing of the name, address and phone number of each player is then printed. When you are finished, choose the main menu.

The fourth and final section of FUNSTATS is the roster review module, reached by selecting 4 from the main menu. When selected, the screen is cleared and ROSTER LISTING is printed at the top of the screen. Then the name, address and phone number of each player is printed to the screen, three players at a time. The module automatically returns to the main menu when out of players.

Two other modules to FUNSTATS are subroutines called by the program that can't be accessed from the menu. The first opens and reads in a game file and passes the statistics string. The second opens and reads in the roster file and is called by the program before a menu selection can be made.

For those who have a 16K system and might want to break FUNSTATS into separate programs, be sure to include the proper file-input subroutines with the modules that require them.

Accessory Programs

Perhaps I missed something, but I couldn't get Disk BASIC to perform a single-drive copy operation. So I wrote COPYFILE for when I am working in Disk BASIC. If you are using JDOS don't bother to use the COPYFILE program.

As mentioned already, if you made any changes in the DIMENSION statements, the file-naming methods, or the roster file fields in the other programs, also make those changes in this program.

When running COPYFILE, you are first prompted to copy a roster file, game file or to quit. When you choose to copy a roster or game file, you are then prompted for the necessary file identification and the file is read into memory. The program assumes

that the source disk is the one in the drive. You are then prompted to place the destination disk in the drive, and the file is written to it. When the write operation is done, you are sent back to the initial prompt.

Now we come to RSTRFXR (*RoSTeR-FiXeR*). If you keep a backup disk or never make mistakes while entering a game file, you won't need to use this program. Again, if you made any changes to the previous programs, you need to repeat them for this program.

"Games are identified solely by their number, and the program is configured to accommodate a season consisting of consecutively numbered games."

The program first prompts for the season, then reads in the roster file and finds the abbreviated name strings. It prompts for a starting and ending game number — if you are repairing a botched roster file, enter 1 for the starting game number, with the last game entered correctly as the ending game number. When preparing a special report, enter the number of the first game included in the report as the starting game number and the last game included in the report as the ending game number.

The program then reads in the respective game files and uses the data to construct a new total statistics array. As you may have concluded by now, games are identified solely by their number, and the program is configured to accommodate a season consisting of consecutively numbered games.

When the new totals have been calculated, you are prompted to save the new array as the roster file or a special file or to send it to the printer. To save it as the roster file, the array reconstructs the total statistics string and is stored to disk as the roster file. To save the data as a special file, you are prompted for a name of eight or less characters, and the total statistics strings are rebuilt from the array and stored on the disk in the roster file format, under the new file name. Essentially what you have created is another roster file covering a specified range of games.

If you choose to send the new data to the

printer, a report is produced in approximately the same format as the FUNSTATS program. For both a printout and a disk file, there is the save to disk and the print option. To do more than one special report at a sitting, exit the program and start from RUN each time to keep from mixing up variables in memory.

This completes the FUNSTATS group of programs. Included are the following two short programs to aid those typing in the listing. You may find them useful in the debugging stages. They are GMFLCHK (Listing 4) and CLRRSTR (Listing 5) or *Game-FileCheck* and *CLeaRRoSTeR*. Use GMFLCHK to look at the contents of the game files directly. Use CLRRSTR to reset the total statistics strings of the roster file to contain nothing but zeroes, as it does when RSTRMKR is used.

The printer I used with these programs is a TRS-80 DMP 100 with minimal special features and generic control codes, so the printer routines should work as is with any other Tandy dot-matrix printer. If you have a different printer, you may need to rework the printer routines.

Other Notes

The roster file is a direct (or random) access file that is named using F1\$; it uses Buffer 2. The roster file records are each 128 bytes long and contain five fields. The first field is the name field NF\$ and is 25 bytes; the second is address field AF\$ and is 30 bytes; the third, city field CF\$ at 20 bytes; the fourth, phone field PF\$ at eight bytes; and the fifth is statistics field SF\$ at 45 bytes.

The game files are sequential, named using F\$ and Buffer 1. Since they are sequential, the records have no specific length. At the start of each game file is the game number GN\$, the name of the other team OT\$, and one-byte string HT\$ containing a yes or no answer to the question "Are we the home team?"

R1\$ and R2\$ contain, respectively, the home and visiting team's score followed by the game's date, D\$. These initial entries are followed by an entry for each player consisting of three strings. The first of the three is the abbreviated name string N2\$; the second, a one-byte string that answers the question "Played in this game?"; and the third, the 45-byte statistics string. So after the initial strings are stored, the rest of the file is composed of these three, repeated for each player in the roster.

If you need to reenter a game file without affecting the roster file, you can use FUNSTATS with a slight modification. Do this by loading FUNSTATS and add the lines: 1301 NEXT K and 1302 CLOSE, then press ENTER. Be sure to delete these lines or to

reload the program before proceeding with normal use.

You may have noticed that once a special report file is stored on disk using RSTRFXR, there is no provision for reopening and printing it out again. To do that, use FUNSTATS. First, note the file name from the disk, then load FUNSTATS and add the line: 6005 F1\$="filename", using the filename from the disk. Run the program, select the print module, and select the statistics-to-date report. At the date prompt, you may

enter a note other than the date, such as a tournament name. Check the printer, position the paper, and press ENTER. Remember to delete the extra line before going on to other functions.

One final note to CoCo 3 users: I wrote this program using a CoCo 1, expanded to 64K. I upgraded to a CoCo 3 and had trouble getting the program to work, but after many frustrating hours, found that the string manipulations were overwriting some of the higher line numbers of the program.

To get around this, enter PCLEAR1 before loading the program. Also, if you find you are being dumped with an Out of String Space Error message, try adjusting the amount of memory reserved by the CLEAR statement.

(Questions or comments concerning this project may be addressed to the author at 4780 SE Christopher Ave., Albany, OR 97321. Please include an SASE when requesting a reply.) □

✓	330	.....	85	3010	.....	88
	1070	.....	117	3130	.....	50
	1200	.....	75	3210	.....	23
	1300	.....	142	4070	.....	73
	1420	.....	222	5130	.....	127
	2050	.....	234	END	.....	160
	2210	.....	240			

Listing 1: FUNSTATS

```

Ø ' COPYRIGHT 1989  FALSOFT, INC
1ØØ REM FUNSTATS
11Ø REM SOFTBALL STATS PROGRAM
12Ø REM DELBERT BAKER COPYRIGHT
1987
13Ø REM 32K ECB COCO 1
14Ø REM RSDOS 1.Ø OR JDOS 1.11
15Ø REM
16Ø CLEAR 5ØØØ
17Ø DIM N$(2Ø), A$(2Ø)
18Ø DIM C$(2Ø), P$(2Ø)
19Ø DIM ST$(2Ø), GS$(2Ø)
2ØØ DIM SU$(13), SA$(13)
21Ø DIM N2$(2Ø), PL$(2Ø)
22Ø DIM S$(2Ø,13), T$(2Ø,13)
23Ø DIM S(2Ø,13), T(2Ø,13)
24Ø DIM U(13)
27Ø CLS:LINE INPUT"SEASON (YY):
";Y$
28Ø Y$=RIGHT$(Y$,2):F1$="ROSTER"
+Y$
29Ø GOSUB 6ØØØ
3ØØ CLS:PRINT:PRINT@47,"MENU":PR
INT
31Ø PRINT"1.  ENTER A GAME":PRIN
T
32Ø PRINT"2.  DISPLAY A GAME OR
TOTALS":PRINT
33Ø PRINT"3.  PRINT A REPORT":PR
INT
34Ø PRINT"4.  REVIEW ROSTER":PRI
NT
35Ø PRINT"5.  QUIT":PRINT
36Ø PRINT@452,"WHICH ONE";:INPUT
B
37Ø IF B<1 OR B>5 THEN 36Ø
38Ø IF B=5 THEN 41Ø

```

```

39Ø ON B GOSUB 1ØØØ,2ØØØ,3ØØØ,4Ø
ØØ
4ØØ GOTO 3ØØ
41Ø CLOSE:END
999 REM NEW GAME DATA ENTRY MODU
LE
1ØØØ CLS:PRINT:LINE INPUT"GAME N
UMBER? ";GN$
1Ø1Ø PRINT:LINE INPUT"OPPOSING T
EAM? ";OT$
1Ø2Ø PRINT:LINE INPUT"ARE WE THE
HOME TEAM? (Y/N) ";HT$
1Ø3Ø PRINT:LINE INPUT"WHAT DID W
E SCORE? ";R1$
1Ø4Ø PRINT:LINE INPUT"WHAT DID T
HEY SCORE? ";R2$
1Ø5Ø PRINT:LINE INPUT"GAME DATE
(MM/DD/YY): ";D$
1Ø6Ø PRINT:F$="GM"+GN$+RIGHT$(D$
,2)
1Ø7Ø OPEN"O",#1,F$:OPEN"D",#2,F1
$,128
1Ø75 FIELD#2,25 AS NF$,3Ø AS AF$
,2Ø AS CF$,8 AS PF$,45 AS SF$
1Ø8Ø IF HT$="N" THEN 1Ø9Ø ELSE T
1$="BUFFALOES":HS$=R1$:T2$=OT$:V
S$=R2$:GOTO11ØØ
1Ø9Ø T1$=OT$:HS$=R2$:T2$="BUFFAL
OES":VS$=R1$
11ØØ CLS:PRINT"GAME NO. ";GN$:PR
INT"HOME ";T1$;" ";HS$
111Ø PRINT"VISITORS ";T2$;" ";
VS$:PRINT"PLAYED ";D$
1115 WRITE #1, GN$,OT$,HT$,R1$,R
2$,D$
112Ø FOR K=1 TO R
113Ø CLS:PRINT N2$(K):LINE INPUT
"PLAYED IN THIS GAME (Y/N)? ";PL$
1135 IF LEFT$(PL$,1)="N" THEN 14
8Ø ELSE 114Ø
114Ø INPUT"AT BATS";U(1):INPUT"R
UNS";U(2)
115Ø INPUT"HITS";U(3):INPUT"WALK
S";U(4)
116Ø INPUT"DOUBLES";U(5):INPUT"T
RIPLES";U(6)
117Ø INPUT"HOMERS";U(7):INPUT"SA
CS";U(8)

```



```

1180 INPUT"RBI'S";U(9):INPUT"TIM
ES ENDED INNING";U(10)
1190 IF (U(1)-U(4)-U(8))=0 THEN
U(11)=0 ELSE U(11)=U(3)/(U(1)-U(
4)-U(8))
1200 IF (U(1)-U(8))=0 THEN U(12)
=0 ELSE U(12)=(U(3)+U(4))/(U(1)-
U(8))
1210 IF U(3)=0 THEN U(13)=1 ELSE
U(13)=(U(3)+U(5)+2*U(6)+3*U(7))/
U(3)
1220 FOR Y=1 TO 10:SA$(Y)=STR$(U
(Y)):NEXT Y
1230 FOR Y=1 TO 10:L=LEN(SA$(Y))
:SA$(Y)="00"+RIGHT$(SA$(Y),L-1):
NEXT Y
1240 FOR Y=1 TO 10:SA$(Y)=RIGHT$(
SA$(Y),3):NEXT Y
1250 FOR Y=11 TO 13:SA$(Y)=STR$(
1000*U(Y)+.5):NEXT Y
1260 IF U(11)=1 THEN SA$(11)="1.
000" ELSE IF U(11)=0 THEN SA$(11)
="0.000" ELSE SA$(11)="0."+MID$(
SA$(11),2,3)
1270 IF U(12)=1 THEN SA$(12)="1.
000" ELSE IF U(12)=0 THEN SA$(12)
="0.000" ELSE SA$(12)="0."+MID$(
SA$(12),2,3)
1280 SA$(13)=MID$(SA$(13),2,1)+
"+MID$(SA$(13),3,3)
1290 GS$(K)="" :FOR Y=1 TO 13:GS$
(K)=GS$(K)+SA$(Y):S(K,Y)=U(Y):NE
XT Y
1300 WRITE #1,N2$(K),PL$,GS$(K)
1305 REM NOW PARSE THE ROSTER FI
LE STATS AND UPDATE
1320 FOR Y=1 TO 10:T(K,Y)=T(K,Y)
+U(Y):NEXT Y
1330 IF (T(K,1)-T(K,4)-T(K,8))=0
THEN T(K,11)=0 ELSE T(K,11)=T(K
,3)/(T(K,1)-T(K,4)-T(K,8))
1340 IF (T(K,1)-T(K,8))=0 THEN T
(K,12)=0 ELSE T(K,12)=(T(K,3)+T(
K,4))/(T(K,1)-T(K,8))
1350 IF T(K,3)=0 THEN T(K,13)=1
ELSE T(K,13)=(T(K,3)+T(K,5)+2*T(
K,6)+3*T(K,7))/T(K,3):T(K,13)=IN
T(1000*T(K,13)+.5)/1000
1360 FOR Y=1 TO 10:SU$(Y)=STR$(T
(K,Y)):NEXT Y
1370 FOR Y=1 TO 10:L=LEN(SU$(Y))
:SU$(Y)="00"+RIGHT$(SU$(Y),L-1):
NEXT Y
1380 FOR Y=1 TO 10:SU$(Y)=RIGHT$(
SU$(Y),3):NEXT Y
1390 FOR Y=11 TO 13:SU$(Y)=STR$(
1000*T(K,Y)+.5):NEXT Y
1400 IF T(K,11)=1 THEN SU$(11)="
1.000" ELSE IF T(K,11)=0 THEN SU
$(11)="0.000" ELSE SU$(11)="0."+
MID$(SU$(11),2,3)

```

```

1410 IF T(K,12)=1 THEN SU$(12)="
1.000" ELSE IF T(K,12)=0 THEN SU
$(12)="0.000" ELSE SU$(12)="0."+
MID$(SU$(12),2,3)
1420 SU$(13)=MID$(SU$(13),2,1)+
"+MID$(SU$(13),3,3)
1430 ST$(K)="" :FOR Y=1 TO 13:ST$
(K)=ST$(K)+SU$(Y):NEXT Y
1440 LSET NF$=N$(K):LSET AF$=A$(
K):LSET CF$=C$(K):LSET PF$=P$(K)
:LSET SF$=ST$(K)
1450 PUT #2,K
1460 NEXT K
1470 G=R:CLOSE:RETURN
1480 GS$(K)=STRING$(45,48)
1490 FOR X=1 TO 13:S(K,X)=0:NEXT
X
1500 WRITE #1,N2$(K),PL$,GS$(K)
1510 GOTO 1460
1999 REM GAME OR TOTALS DISPLAY
2000 CLS:PRINT"DISPLAY A <G>AME
OR <T>OTALS TO DATE OR GOTO THE
<M>AIN MENU.";
2010 B$=INKEY$:IF B$="G" THEN 20
20 ELSE IF B$="T" THEN 2190 ELSE
IF B$="M" THEN RETURN ELSE 2010
2020 CLS:LINE INPUT"GAME NO. ";G
A$
2030 IF GA$=GN$ THEN 2040 ELSE G

```

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```

N$=GA$: GOSUB 5010
2040 CLS:PRINT@0,"GAME NO. ";GN
$:PRINT@16,"PLAYED: ";D$
2050 PRINT@32,"HOME: ";T1$;"-";H
S$
2060 PRINT@64,"VISITOR: ";T2$;"-
";VS$
2070 PRINT@96,STRING$(32,"-"):X=
G
2080 FOR K=1 TO X
2090 PRINT@128,N2$(K)
2100 PRINT@192,"AT BATS: ";S(K,1
):PRINT@208,"RUNS: ";S(K,2)
2110 PRINT@224,"HITS: ";S(K,3):P
RINT@240,"WALKS: ";S(K,4)
2120 PRINT@256,"DOUBLES: ";S(K,5
):PRINT@272,"TRIPLES: ";S(K,6)
2130 PRINT@288,"HOMERS: ";S(K,7)
:PRINT@304,"SACS: ";S(K,8)
2140 PRINT@320,"RBI'S: ";S(K,9):
PRINT@336,"END INN: ";S(K,10)
2150 PRINT@352,"BAT AV: ";:PRINT
USING"#.###";S(K,11):PRINT@368,"
ON BS AV: ";:PRINTUSING"#.###";S
(K,12)
2160 PRINT@384,"SLUG AV: ";:PRIN
TUSING"#.###";S(K,13)
2170 PRINT@448,"PRESS ANY KEY TO
CONTINUE";B$=INKEY$:IF B$="" T
HEN 2170
2180 NEXT K:GOTO 2000
2190 CLS:LINE INPUT"Today's DATE
: ";TD$
2200 CLS:PRINT@32,"TOTAL STATS A
S OF ";TD$
2210 PRINT@96,STRING$(32,"-"):X=
R
2220 FOR K=1 TO X
2230 PRINT@128,N2$(K)
2240 PRINT@192,"AT BATS: ";T(K,1
):PRINT@208,"RUNS: ";T(K,2)
2250 PRINT@224,"HITS: ";T(K,3):P
RINT@240,"WALKS: ";T(K,4)
2260 PRINT@256,"DOUBLES: ";T(K,5
):PRINT@272,"TRIPLES: ";T(K,6)
2270 PRINT@288,"HOMERS: ";T(K,7)
:PRINT@304,"SACS: ";T(K,8)
2280 PRINT@320,"RBI'S: ";T(K,9):
PRINT@336,"END INN: ";T(K,10)
2290 PRINT@352,"BAT AV: ";:PRINT
USING"#.###";T(K,11):PRINT@368,"
ON BS AV: ";:PRINTUSING"#.###";T
(K,12)
2300 PRINT@384,"SLUG AV: ";:PRIN
TUSING"#.###";T(K,13)
2310 PRINT@448,"PRESS ANY KEY TO
CONTINUE";B$=INKEY$:IF B$="" T
HEN 2310
2320 NEXT K:GOTO 2000
2999 REM REPORT PRINTING ROUTINE
3000 CLS:PRINT:PRINT"<G>AME REPO

```

```

RT"
3010 PRINT:PRINT"<S>TATS TO DATE
REPORT"
3020 PRINT:PRINT"<R>OSTER LISTIN
G"
3030 PRINT:PRINT"<M>AIN MENU":PR
INT:PRINT
3040 B$=INKEY$:IF B$="" THEN 304
0
3050 IF B$="G" THEN 3060 ELSE IF
B$="S" THEN 3160 ELSE IF B$="R"
THEN 3220 ELSE IF B$="M" THEN R
ETURN ELSE 3040
3060 CLS:LINE INPUT"GAME NO. ";G
A$
3070 IF GA$=GN$ THEN 3090 ELSE G
N$=GA$
3080 GOSUB 5010
3085 REM GAME REPORT
3090 INPUT"PRINTER ON? PAPER POS
ITIONED? PRESS <ENTER> WHEN RE
ADY";B$
3100 PRINT#-2,"GAME NO. ";GN$;"
";"HOME ";T1$;"--";HS$;" "; "VIS
ITORS ";T2$;"--";VS$;" "; "PLAYE
D ";D$:PRINT#-2
3110 X=G
3120 PRINT#-2,CHR$(10);CHR$(15);
TAB(4)"NAME";TAB(20)" AB R
H BB 2B 3B HR SAC RBI EI
BA OBA SLA";CHR$(14);CHR$(1
0)
3130 FOR K=1 TO G
3140 PRINT#-2,N2$(K);TAB(20)S(K,
1);TAB(24)S(K,2);TAB(28)S(K,3);T
AB(32)S(K,4);TAB(36)S(K,5);TAB(4
0)S(K,6);TAB(44)S(K,7);TAB(48)S(
K,8);TAB(52)S(K,9);TAB(56)S(K,10
);TAB(60)S(K,11);TAB(64)S(K,12);
TAB(68)S(K,13)
3150 NEXT K:GOTO 3000
3160 CLS:LINE INPUT"Today's DATE
: ";TD$
3165 INPUT"PRINTER ON? PAPER POS
ITIONED? PRESS <ENTER> WHEN RE
ADY.";B$
3170 PRINT#-2,CHR$(10);TAB(24);C
HR$(15);"STATISTICS REPORT AS OF
";TD$;CHR$(14);CHR$(10)
3180 PRINT#-2,CHR$(10);CHR$(15);
TAB(4)"NAME";TAB(20)" AB R H
BB 2B 3B HR SAC RBI EI
BA OBA SLA";CHR$(14);CHR$(1
0)
3190 FOR K=1 TO R
3200 PRINT#-2,N2$(K);TAB(19)T(K,
1);TAB(23)T(K,2);TAB(27)T(K,3);T
AB(31)T(K,4);TAB(35)T(K,5);TAB(3
9)T(K,6);TAB(43)T(K,7);TAB(47)T(
K,8);TAB(51)T(K,9);TAB(55)T(K,10
);TAB(59)T(K,11);TAB(64)T(K,12);

```



```

TAB(72)T(K,13)
3210 NEXT K:GOTO 3000
3215 REM MAKE A HARDCOPY OF THE
ROSTER
3220 CLS:INPUT"PRINTER ON? PAPER
POSITIONED? PRESS <ENTER> WHE
N READY.";B$
3230 PRINT#-2,CHR$(31);TAB(17)CH
R$(15);"ROSTER";CHR$(14);CHR$(30
);CHR$(10)
3240 FOR K=1 TO R
3250 FOR X=1 TO 10:IF RIGHT$(N$(
K),1)<>" " THEN 3260 ELSE N$(K)=
LEFT$(N$(K),LEN(N$(K))-1):NEXT X
3260 FOR X=1 TO 10:IF RIGHT$(A$(
K),1)<>" " THEN 3270 ELSE A$(K)=
LEFT$(A$(K),LEN(A$(K))-1):NEXT X
3270 PRINT#-2,N$(K);TAB(22)A$(K)
;TAB(46)C$(K);TAB(66)P$(K)
3280 NEXT K:GOTO 3000
3999 REM ROSTER REVIEW
4000 CLS:PRINT TAB(13)"ROSTER LI
STING":Y=1
4010 PRINT"PRESS ANY KEY TO CONT
INUE";
4020 B$=INKEY$:IF B$="" THEN 402
0
4030 CLS:FOR K=Y TO Y+2
4040 PRINTN$(K):PRINTA$(K):PRINT
C$(K);TAB(23)P$(K):PRINT
4050 IF K=R THEN 4080 ELSE 4060
4060 NEXT K
4070 Y=Y+3:GOTO 4010
4080 PRINT@481,"THAT'S ALL--PRES
S ANY KEY";
4090 B$=INKEY$:IF B$="" THEN 409
0 ELSE RETURN
4999 REM INPUT A GAME FILE
5000 CLS:LINE INPUT"GAME NO.: ";
GN$
5010 F$="GM"+GN$+Y$
5020 OPEN "I",#1,F$
5030 INPUT #1,GN$,OT$,HT$,R1$,R2
$,D$
5040 IF HT$="N" THEN 5050 ELSE T
1$="BUFFALOES":HS$=R1$:T2$=OT$:V
S$=R2$:GOTO 5060
5050 T1$=OT$:HS$=R2$:T2$="BUFFAL

```

```

OES":VS$=R1$
5060 G=0
5070 IF EOF(1)=-1 THEN 5100
5080 G=G+1:INPUT #1,N2$(G),PL$(G
),GS$(G)
5090 GOTO 5070
5095 REM NOW PARSE THE STAT STRI
NG
5100 FOR K=1 TO G
5110 FOR Y=1 TO 10:S$(K,Y)=MID$(
GS$(K),3*Y-2,3):NEXT Y
5120 Z=31:FOR Y=11 TO 13:S$(K,Y)
=MID$(GS$(K),Z,5):Z=Z+5:NEXT Y
5130 FOR Y=1 TO 13:S(K,Y)=VAL(S$
(K,Y)):NEXT Y
5140 NEXT K
5150 CLOSE #1:RETURN
5999 REM INPUT THE ROSTER FILE A
ND FIND N2$
6000 CLS:PRINT"READING THE ROSTE
R FILE."
6010 OPEN "D",#2,F1$,128:R=LOF(2
)
6020 FIELD #2,25 AS NF$,30 AS AF
$,20 AS CF$,8 AS PF$,45 AS SF$
6030 FOR K=1 TO R
6040 GET #2,K
6050 N$(K)=NF$:A$(K)=AF$:C$(K)=C
F$:P$(K)=PF$:ST$(K)=SF$
6060 NEXT K
6065 REM PARSE THE STAT STRING
6070 PRINT"PARSING THE STAT STRI
NG":FOR K=1 TO R
6080 FOR Y=1 TO 10:T$(K,Y)=MID$(
ST$(K),3*Y-2,3):NEXT Y
6090 Z=31:FOR Y=11 TO 13:T$(K,Y)
=MID$(ST$(K),Z,5):Z=Z+5:NEXT Y
6100 FOR Y=1 TO 13:T(K,Y)=VAL(T$
(K,Y)):NEXT Y
6110 NEXT K
6115 REM FIND N2$
6120 PRINT"FINDING THE 2ND NAME
STRINGS":Q$="",
6130 FOR K=1 TO R:M=INSTR(1,N$(K
),Q$)+1
6140 N2$(K)=LEFT$(N$(K),M)
6150 NEXT K
6160 CLOSE #2:RETURN

```

Listing 2: RSTRMKR

```

0 ' COPYRIGHT 1989 FALSOFT, INC
100 REM ROSTERMAKER
110 REM DELBERT BAKER COPYRIGHT
1987
120 REM SET UP A NEW ROSTER FILE
130 CLEAR 5000
140 DIM N$(20), A$(20)
150 DIM C$(20), P$(20)

```

```

160 C1$="Albany, OR 97321":C2$="
Corvallis, OR 97330"
170 CLS:PRINT@9,"NEW ROSTER FILE
":PRINT
180 INPUT"WHAT SEASON IS THIS";Y
$:PRINT
190 F1$="ROSTER"+RIGHT$(Y$,2)
200 X=1:CLS:PRINT@4,"ENTER PLAYE
R INFORMATION"
210 LINE INPUT"LAST NAME: ";NA$

```

```

220 IF NA$="STOP" THEN 300
230 LINE INPUT"FIRST NAME: ";NB$
240 N$(X)=NA$+" "+NB$
250 LINE INPUT"ADDRESS: ";A$(X)
260 LINE INPUT"CITY, STATE ZIP
1 2 INPUT      :";C$(X)
270 IF C$(X)="1" THEN C$(X)=CI$
ELSE IF C$(X)="2" THEN C$(X)=C2$
ELSE 280
280 LINE INPUT"PHONE NUMBER: ";P
$(X):PRINT
290 X=X+1:GOTO210
300 X=X-1:CLS:PRINT@12,"SORTING"
310 F=0
320 FOR Y=1 TO X-1
330 IF N$(Y)<=N$(Y+1) THEN 370 E
LSE 340
340 SI$=N$(Y):S2$=A$(Y):S3$=P$(Y
):S4$=C$(Y)
350 N$(Y)=N$(Y+1):A$(Y)=A$(Y+1):
P$(Y)=P$(Y+1):C$(Y)=C$(Y+1)
360 N$(Y+1)=S1$:A$(Y+1)=S2$:P$(Y
+1)=S3$:C$(Y+1)=S4$:F=1
370 NEXT Y
380 IF F<>0 THEN 310 ELSE 390
390 PRINT"SORTING DONE.":PRINT
400 PRINT"<S>CREEN OR <D>ISK OR

```

```

<Q>UIT"
410 PRINT:PRINT"PRESS <S> OR <D>
OR <Q>"
420 B$=INKEY$:IF B$="S" THEN 430
ELSE IF B$="D" THEN 510 ELSE IF
B$="Q" THEN END ELSE 420
430 Y=I
440 PRINT"PRESS ANY KEY TO CONTI
NUE.";
450 B$=INKEY$:IF B$="" THEN 450
460 CLS:FOR K=Y TO Y+2
470 PRINT N$(K):PRINT A$(K):PRIN
T C$(K):TAB(20)P$(K):PRINT
480 IF K=X THEN 400 ELSE 490
490 NEXT K
500 Y=Y+3:GOTO 440
510 OPEN"D",#2,F1$,128:SB$=STRIN
G$(45,"0")
520 FIELD #2,25 AS NF$,30 AS AF$
,20 AS CF$,8 AS PF$,45 AS SF$
530 FOR K=1 TO X
540 LSET NF$=N$(K):LSET AF$=A$(
K):LSET CF$=C$(K):LSET PF$=P$(K)
:LSET SF$=SB$
550 PUT #2,K:NEXT K
560 CLOSE 2:PRINT"ROSTER STORED
AS ";F1$:GOTO 400

```

Listing 3: RSTRFXR

```

0 ' COPYRIGHT 1989 FALSOFT, INC
100 REM ROSTERFIXER (RSTRFXR)
110 REM RECALCULATION OF THE TOT
AL STAT STRING
120 REM COPYRIGHT 1987 DELBERT B
AKER
130 REM 32K ECB COCO 1
140 REM
150 CLEAR 5000
160 DIM N$(20),A$(20)
170 DIM C$(20),P$(20)
180 DIM ST$(20),GS$(20)
190 DIM SU$(13),SA$(13)
200 DIM N2$(20),PL$(20)
210 DIM S$(20,13),T$(20,13)
220 DIM S(20,13),T(20,13)
230 DIM U(13)
240 CLS:LINE INPUT"SEASON (YY):
";Y$
250 Y$=RIGHT$(Y$,2):F1$="ROSTER"
+Y$
260 OPEN"D",#2,F1$,128:R=LOF(2)
270 FIELD #2,25 AS NF$,30 AS AF$
,20 AS CF$,8 AS PF$,45 AS SF$
280 FOR K=1 TO R
290 GET#2,K
300 N$(K)=NF$:A$(K)=AF$:C$(K)=CF
$:P$(K)=PF$:FOR Y=1 TO 13:T(K,Y)

```

```

=0:NEXT Y
310 NEXT K:CLOSE #2
320 PRINT"FINDING THE 2ND NAME S
TRING":Q$=","
330 FOR K=1 TO R:M=INSTR(I,N$(K)
,Q$)+1
340 N2$=LEFT$(N$(K),M)
350 NEXT K
360 CLS:PRINT" THIS PROGRAM I
S TO PREPARE SPECIAL REPORTS AN
D TO REPAIR A BOTCHED STAT STRIN
G IN A ROSTER FILE."
370 PRINT"ENTER A RANGE OF GAME
NUMBERS AT THE PROMPTS.":PRINT
380 LINE INPUT"START AT GAME NO.
: ";SG$:PRINT
390 LINE INPUT"END AT GAME NO.:
";EG$:PRINT
400 PRINT"PLACE THE GAME DATA DI
SK IN THE DRIVE."
410 LINE INPUT"PRESS <ENTER> WHE
N READY.":B$
420 SG=VAL(SG$):EG=VAL(EG$)
430 FOR X=SG TO EG
440 GN$=STR$(X):L=LEN(GN$):GN$=R
IGHT$(GN$,L-1)
450 F$="GM"+GN$+Y$
460 OPEN"I",#1,F$
470 INPUT #1,GN$,OT$,HT$,R1$,R2$
,D$

```


W

GAME POINT

SOFTWARE

This Month's Feature

NEW
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by Steve Bjork

A hostile space fortress has been spotted at the outer edge of our galaxy. Destroy this menacing battle platform by navigating your spacecraft with the utmost skill to scale walls; dodge force fields; blow up fuel tanks; dog fight defense ships; evade comets and ultimately disable the powerful robot overlord!

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For CoCo 1, 2

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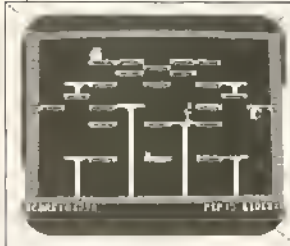
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Help Rupert infiltrate "Music Box Records" and collect all of his stolen notes which are scattered throughout the complex. Ride the crazy elevators and beware of the security robots on patrol.

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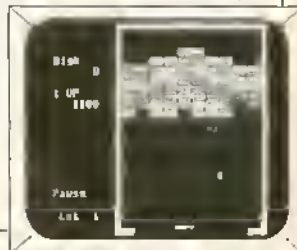
NEW
For CoCo 1, 2, 3

BASH

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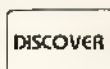
by Steve Bjork

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```

480 G=0:CLS:PRINT"WORKING ON GAM
E";X
490 IF EOF(1)=-1 THEN 580
500 G=G+1:INPUT#1,N2$(G),PL$(G),
GS$(G):PRINT N2$(G)
510 FOR Y=1 TO 10:SS$(G,Y)=MID$(G
SS$(G),3*Y-2,3):NEXT Y
530 FOR Z=1 TO 10:T(G,Z)=T(G,Z)+
VAL(SS$(G,Z)):NEXT Z
540 IF (T(G,1)-T(G,4)-T(G,8))=0
THEN T(G,11)=0 ELSE T(G,11)=T(G,
3)/(T(G,1)-T(G,4)-T(G,8))
550 IF (T(G,1)-T(G,8))=0 THEN T(
G,12)=0 ELSE T(G,12)=(T(G,3)+T(G
,4))/(T(G,1)-T(G,8))
560 IF T(G,3)=0 THEN T(G,13)=1 E
LSE T(G,13)=(T(G,3)+T(G,5)+2*T(G
,6)+3*T(G,7))/T(G,3)
570 GOTO 490
580 CLOSE #1:NEXT X
590 PRINT"REBUILDING THE STAT ST
RING":FOR K=1 TO R
600 FOR Y=1 TO 10:T$(K,Y)=STR$(T
(K,Y)):NEXT Y
610 FOR Y=1 TO 10:L=LEN(T$(K,Y))
:T$(K,Y)="00"+RIGHT$(T$(K,Y),L-1
):NEXT Y
620 FOR Y=11 TO 13:T$(K,Y)=STR$(
1000*T(K,Y)+.5):NEXT Y
630 IF T(K,11)=1 THEN T$(K,11)="
1.000" ELSE IF T(K,11)=0 THEN T$
(K,11)="0.000" ELSE T$(K,11)="0.
"+MID$(T$(K,11),2,3)
640 IF T(K,12)=1 THEN T$(K,12)="
1.000" ELSE IF T(K,12)=0 THEN T$
(K,12)="0.000" ELSE T$(K,12)="0.
"+MID$(T$(K,12),2,3)
650 T$(K,13)=MID$(T$(K,13),2,1)+
"."+MID$(T$(K,13),3,3)
660 FOR Y=1 TO 10:T$(K,Y)=RIGHT$
(T$(K,Y),3):NEXT Y
670 ST$(K)="" :FOR Y=1 TO 13:ST$(
K)=ST$(K)+T$(K,Y):NEXT Y
680 NEXT K
700 CLS:PRINT"GAMES";SG;" TO";EG
;" RECALCULATED.":PRINT
710 PRINT"SAVE TO <R>OSTER FILE.
":PRINT
720 PRINT"SAVE TO <S>PECIAL FILE
.":PRINT

```

```

730 PRINT"SEND TO <P>RINTER.":PR
INT
740 PRINT"<Q>UIT":PRINT
750 PRINT"<R>, <S>, <P>, OR <Q>:
";
760 A$=INKEY$:IF A$="R" THEN 780
ELSE IF A$="S" THEN 770 ELSE IF
A$="P" THEN 850 ELSE IF A$="Q"
THEN 940 ELSE 760
770 CLS:LINE INPUT"INPUT SPECIAL
FILE NAME (8 OR LESS CHARACTE
RS)":F1$:IF LEN(F1$)>8 THEN 770
780 REM GOSUB 900
790 OPEN"D",#2,F1$,128
800 FIELD#2,25 AS NF$,30 AS AF$,
20 AS CF$,8 AS PF$,45 AS SF$
810 FOR X=1 TO R
820 LSET NF$=N$(X):LSET AF$=A$(X
):LSET CF$=C$(X):LSET PF$=P$(X):
LSET SF$=S$(X)
830 PUT#2,X:NEXT X
840 CLOSE #2:PRINT"FILE STORED A
S ";F1$:GOTO 710
850 CLS:PRINT"PRINTER ON? PAPER
POSITIONED?"
860 PRINT"PRESS <ENTER> WHEN REA
DY.":INPUT B$
870 PRINT#-2,TAB(21)"SPECIAL REP
ORT FROM GAME";SG;" TO";EG
880 PRINT#-2,CHR$(10);CHR$(15);T
AB(4)"NAME";TAB(20)" AB R H
BB 2B 3B HR SAC RBI EI B
A OBA SLA";CHR$(14);CHR$(10)
890 FOR K=1 TO R
900 PRINT#-2,N2$(K);TAB(19)T(K,1
);TAB(23)T(K,2);TAB(27)T(K,3);TA
B(31)T(K,4);TAB(35)T(K,5);TAB(39
)T(K,6);TAB(43)T(K,7);TAB(47)T(K
,8);TAB(51)T(K,9);TAB(55)T(K,10)
;TAB(59)INT(1000*T(K,11)+.5)/100
0;TAB(64)INT(1000*T(K,12)+.5)/10
00;
901 PRINT#-2,TAB(72)INT(1000*T(K
,13)+.5)/1000
910 NEXT K
920 GOTO 700
930 REM A$=INKEY$:IF A$="" THEN
810 ELSE IF A$="Q" THEN 820 ELSE
240
940 CLOSE:END

```

Listing 4: GMFLCHK

```

0 ' COPYRIGHT 1989 FALSOFT, INC
5 CLS:INPUT"GAME NO.":Z$
7 F$="GM"+Z$+"87"
10 OPEN"I",#1,F$
20 INPUT#1,GN$,OT$,HT$,R1$,R2$,D
$

```

```

30 PRINT GN$,OT$,HT$,R1$,R2$,D$
40 IF EOF(1)=-1 THEN END
50 INPUT#1,N2$,PL$,GS$
60 PRINT N2$,PL$,GS$
70 A$=INKEY$
80 IF A$="" THEN 70 ELSE 40
90 END

```


Listing 5: CLRRSTR

```

0 ' COPYRIGHT 1989  FALSOFT, INC
10 OPEN "D", #2, "ROSTER87", 128
20 FIELD #2, 25 AS NF$, 30 AS AF$, 2
0 AS CF$, 8 AS PF$, 45 AS SF$
30 R=LOF(2):SB$=STRING$(45,"0")
40 FOR X=1 TO R
50 GET #2,X
60 N$=NF$:ST$=SF$
70 PRINT N$:PRINT ST$

```

```

80 PRINT "CLEAR THIS ONE? (Y/N) "
90 A$=INKEY$
100 IF A$="N" THEN 130 ELSE IF A
$="Y" THEN 110 ELSE 90
110 LSET SF$=SB$
120 PUT #2,X
130 NEXT X
140 CLOSE:END

```

Listing 6: COPYFILE

```

0 ' COPYRIGHT 1989  FALSOFT, INC
100 CLEAR5000
110 DIM N$(20),A$(20)
120 DIM C$(20),P$(20)
130 DIM ST$(20),N2$(20)
140 DIM PL$(20),GS$(20)
150 CLS:PRINT:PRINT "COPY <R>OSTE
R FILE, ":PRINT
160 PRINT "COPY <G>AME FILE, ":PRI
NT
170 PRINT "OR <Q>UIT. ":PRINT
180 PRINT "R,G, OR Q?:";
190 A$=INKEY$:IF A$="R" THEN 200
ELSE IF A$="G" THEN 390 ELSE IF
A$="Q" THEN 560 ELSE 190
200 CLS:LINEINPUT "SEASON (YY): "
;Y$
210 PRINT:PRINT "COPYING ROSTER F
ILE FOR THE ";Y$;" SEASON"
220 F1$="ROSTER"+RIGHT$(Y$,2)
230 OPEN "D", #2, F1$, 128:R=LOF(2)
240 FIELD #2, 25 AS NF$, 30 AS AF$
, 20 AS CF$, 8 AS PF$, 45 AS SF$
250 FOR K=1 TO R
260 GET #2,K
270 N$(K)=NF$:A$(K)=AF$:C$(K)=CF
$:P$(K)=PF$:SP$(K)=SF$
280 NEXT K
290 CLOSE #2
300 PRINT "PLACE THE DESTINATION
DISK IN THE DRIVE.  PRESS <ENTER
>.";
310 INPUT Z
320 OPEN "D", #2, F1$, 128
330 FIELD #2, 25 AS NF$, 30 AS AF$
, 20 AS CF$, 8 AS PF$, 45 AS SF$

```

```

340 FOR K=1 TO R
350 LSET NF$=N$(K):LSET AF$=A$(K
):LSET CF$=C$(K):LSET PF$=P$(K):
LSET SF$=SP$(K)
360 PUT #2,K
370 NEXT K
380 CLOSE #2:PRINT "ROSTER COPIED
":FOR X=1 TO 500:NEXTX:GOTO 150
390 CLS:LINEINPUT "SEASON (YY): "
;Y$:PRINT
400 LINEINPUT "GAME NUMBER: ";GN
$
410 F$="GM"+GN$+Y$
420 OPEN "I", #1, F$
430 INPUT #1,GN$,OT$,HT$,R1$,R2$
,D$
440 G=0
450 IF EOF(1)=-1 THEN 480
460 G=G+1:INPUT #1,N2$(G),PL$(G)
,GS$(G)
470 GOTO 450
480 CLOSE #1:PRINT "PLACE THE DES
TINATION DISK IN THE DRIVE.  PRE
SS <ENTER>."
490 INPUT Z
500 OPEN "O", #1, F$
510 WRITE #1,GN$,OT$,HT$,R1$,R2$
,D$
520 FOR K=1 TO G
530 WRITE #1,N2$(K),PL$(K),GS$(K
)
540 NEXT K
550 CLOSE #1:PRINT "GAME FILE COP
IED.":FOR X=1 TO 500:NEXTX:GOTO 1
50
560 END

```



A wildcard utility for those hard-to-find disk files

Selective Directory Listings Using Wildcards

By Richard Estrado

Have you ever had to strain your eyes looking through a long directory listing for one hard-to-pin-down program? Or search through a large batch of disks for one file or group of files? Or even worse, try to find a file whose filename you just can't remember: Well, *Wildcard* may be just the help you need.

Wildcard is a utility that enhances the DIR command of the CoCo 2 or 3, enabling it to display selective directory listings using wildcards. It requires a Tandy Color Computer 2 or 3 with Extended Disk BASIC versions 1.1 or 2.1, at least 64K of RAM and one disk drive.

Here's how *Wildcard* works:

1) The DIR command can be used as usual with either a drive number following it or not. DIR or DIR1 etc. . .

2) The user can enter a filename only according to BASIC's standard syntax for entering filenames. DIR "FILE.EXT" or DIR "FILE\EXT:1"

3) The user can use one wildcard in either the filename or extension. The character used for the wildcard is the asterisk (*). DIR "FILE.*" or DIR "FI*.BAS"

In the above examples, all characters in the filename or extension occurring from the point of the wildcard are disregarded by the search routines in *Wildcard*. The result in Example 1 is

Richard Estrado has studied and taught Computer Science for the past four years at Fatima College, Trinidad.

Listing 1: WILDBIN

```

00010 * WILDCARDS
00020 *
00025 * COPYRIGHT 1989  FALSOFT,INC
00026 *
00027 ORG      $503B
00030 START  CLRA
00040 LDX      #WILD  LOAD ADDR OF WILD IN X
00050 STX      $C1F1  STORE IN JUMP TABLE ENTRY
00060 WILD   LDA      [$A6]  CHAR CURRENTLY BEING PROCESSED
00070 CMPA    #" "    IS IT ("") ?
00080 BEQ     GTFN   IF SO THEN GET FILE NAME
00090 LBR4    $CCA9   ELSE RETURN TO OLD DIR
00100 CTFN   LBSR    $C935  GET FILE NAME ECT.
00110 LDA     $094C  GET FIRST CHAR OF FNAME
00120 ADDA    $0954  ADD FIRST CHAR OF EXT
00130 CMPA    #84    IS IT "*,*" ?
00140 LBEQ    $CCA9  IF SO THEN COTO OLD DIR
00150 *
00160 * SET UP DSKON PARAMETERS
00170 *
00180 JSR      $C79D  MAKE SURE FAT IS VALID
00190 JSR      $B958  PRINT CARRIGE RETURN
00200 LDD      #$1102 *
00210 STA     $00EC  *
00220 STB     $EA    *
00230 LDB     #3     * SET UP DSKCON PARMS
00240 STORE  STB     $ED  *
00250 LDX     #$600   * POINT X TO DISK BUFFER
00260 STX     $EE     *
00270 JSR      $D6F2  READ A SECTOR
00280 COMP   TFR     X,U  COPY X POINTER TO U
00290 LDA     ,X      LOAD FIRST CHAR OF DIRECTORY
00300 BEQ     ADVAN   IF 0 THEN ADVANCE POINTER
00310 COMA    CHECK  END OF DIRECTORY: $FF
00320 LBEQ    END     IF IT IS, THEN END
00330 *
00340 * COMPARE FILE NAME
00350 *
00360 SERCH1  LDY      #$094C  POINT Y TO START OF FILENAME
00370 COMPI   LDA      ,Y      LOAD CHAR OF FILENAME IN ACCA
00380 CMPA    #"* "    IS IT AN ASTERISK?
00390 LBEQ    SERCH2  IF SO, GO SEARCH THE EXTENSION
00400 CMPA    ,U+      COMPRE WITH DATA IN I/O BUFFER
00410 BNE     ADVAN   IF MISMATCH THEN AVANCE
00420 CMPY    #$953    CHECK FOR END OF FILENAME
00430 BEQ     SERCH2  IF AT END, START EXT SEARCH
00440 LEAY    1,Y      INCREMENT FILENAME POINTER
00450 JMP     COMPI    LOOP TO COMPI
00460 SERCH2 LEAX     8,X    SET X POINTER TO EXT
00470 TFR     X,U      COPY THIS VALUE TO U

```



```

599F 138E 9954      994B9      LDY      #9954      POINT Y TO EXTENSION
59A3 A6 A4          99499 COMP2    LDA      ,Y        LOAD CHAR OF EXT IN AGCA
59A5 81 2A          99599      CMPA     #'*       IS IT AN ASTERISK?
59A7 1927 9923      99519      LBEQ     DUMP     IF SO THEN DUMP DIR ENTRY
59AB A1 C9          99529      CMPA     ,U+     COMPARE CHAR IN I/O BUFFER
59AD 27 94          99539      BEQ      COMP3    IF MATCH THEN GOTO COMP3
59AF 39 18          99549      LEAX     -8,X     ELSE RESET X POINTER
59B1 29 9D          99559      BRA      ADVAN    AND ADVANCE TO NEXT DIR ENTRY
59B3 198C 9956      99569 COMP3    CMPY     #9956    CHECK FOR END OF EXT
59B7 26 92          99579      BNE     NEXT     IF IT'S NOT THEN GOTO NEXT
59B9 29 13          99589      BRA      DUMP     ELSE DUMP DIR ENTRY
59BB 31 21          99599 NEXT    LEAY     1,Y      INCREMENT EXT CHAR POINTER
59BD 7E 59A3        99699      JMP      COMP2    LOOP TO COMP2
                    99619 *
                    99629 * ADVANCE THE DIRECTORY POINTER
                    99639 *
59C9 39 88 29       99649 ADVAN    LEAX     32,X     INC. MAIN BUFFER POINTER
59C3 8C 9799        99659      CMPX     #9799    ARE WE AT END OF BUFFER?
59C6 26 AD          99669      BNE     COMP     IF NOT THEN LOOP TO COMP
59C8 5C            99679      INCB     INCB     INCREMENT SECTOR POINTER
59C9 C1 9B          99689      CMPB     #11     CHECK WITH MAX SECTOR NO*
59CB 23 9E          99699      BLS     STORE    IF >11 THEN GOTO STORE
59CD 39            99799      RTS         IF AT END, RETURN TO BASIC
                    99719 *
                    99729 * DUMP THE DIRECTORY LINE
                    99739 *
59CE 39 18          99749 DUMP     LEAX     -8,X     RE-ADJUST X POINTER
59D9 35 49          99759      PULS     U        SAVE TOP OF STACK
59D2 BD A549        99769      JSR     $A549    CO DO A BREAK CHECK
59D5 34 49          99779      PSHS     U        RESTORE STACK
59D7 34 94          99789      PSHS     B        SAVE B;SECTOR POINTER
59D9 34 19          99799      PSHS     X        SAVE X;I/O BUFFER POINTER
59DB C6 98          99899      LDB      #8        *
59DD BD B9A2        99B19      JSR     $B9A2    *
59DE 9D CD1B        99B29      JSR     $CD1B    *
59E3 C6 93          99839      LDB      #3        *
59E5 BD B9A2        99B49      JSR     $B9A2    *
59EB BD CD1B        99B59      JSR     $CD1B    *
59ED E6 99          99869      LDB      8,X      * THIS SECTION OF CODE
59ED C1 9A          99879      CMPB     #19      * SIMPLY DUMPS THE DIRECTORY
59EF 1924 9993      99BB9      LBCC     CLEAR    * ENTRY WHICH HAS PASSED THE
59F3 17 7C25        99899      LBSR     $CD1B    * COMPARISON CHECKS ABOVE
59F6 4F            99999 CLEAR    CLRA     *
59F7 BD BDCC        99919      JSR     $BDCC    *
59FA 17 7C1E        99929      LBSR     $CD1B    *
59FD AE E4          99939      LDX      ,S        *
59FF B6 42          99949      LDA      #542     *
5101 AB 9C          99959      ADDA     12,X     *
5103 17 7C12        99969      LBSR     $CD1B    *
5106 E6 9D          99979      LDB      13,X     *
5108 17 7C13        99989      LBSR     $CD1E    *
510B 1F B9          99999      TFR      A,B      *
510D 4F            91999      CLRA     *
510E BD BDCC        91919      JSR     $BDCC    *
5111 BD B958        91929      JSR     $B958    *
5114 35 19          91939      PULS     X        RESTORE X
5116 35 94          91949      PULS     B        RESTORE B
5118 29 A6          91959      BRA      ADVAN    GO ADVANCE POINTER
511A 39            91969 END      RTS         RETURN TO BASIC
                    91979      END

```

99999 TOTAL ERRORS

that all files with a name of FILE and any extension is listed. In Example 2, all files with the first two characters FI and an extension of BAS are listed.

4) The user can specify two wildcards in one filename, but if the filename is *.* , all files are listed. Also keep in mind that if the filename is *.* , the drive number in the filename is ignored.

Type in the assembly language code (Listing 1) given in *EDTASM+* and assemble it. After a successful assembly (no errors), exit from the assembler. At the BASIC prompt type the following line:

```
SAVEM"WILD",20539,20762,20539
```

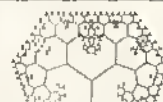
The trailing numbers in the above line are decimal equivalents to the locations of the labels END and START in the source code. To use it, just enter LOADM "WILD":EXEC20539.

You can alternatively type in the BASIC program and save it with this line: SAVE"WILD".

After running the program, control is automatically transferred to the routine from the old DIR command. Therefore it is not necessary to type EXEC every time you wish to use the wildcard feature.

One important point for CoCo 2 users is to put the machine into all-RAM mode before running the program. Since the CoCo 3 is always in this mode, it does not require that step. Joseph Forgione's ALLRAM program ("Prompt Attention," July '87, Page 97) puts the CoCo into an all-RAM mode. The program is found in Listing 3.

(Questions or comments about the program may be directed to the author at 43 Sapphire Crescent, Diamond Vale, Diego Martin, Trinidad, West Indies. Please include an SASE if requesting a reply.)



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Listing 2: WILDBAS

```

10 *****
20 * WILDCARD UTILITY *
30 * By Richard Estrado *
40 * *
46 * RUN THE PROGRAM *
50 * IN "ALL RAM" MODE *
70 *****
80 'COPYRIGHT 1989 FALSOFT, INC
90 DATA 79,142,80,66,191,193,241
,166,159,0,166,129,34,39,3,22,12
4,92,23,120,229,182,9,76,187,9,8
4,129,84,16,39,124,77,189,199,15
7,189,185,88,204,17,2,151,236
100 DATA 215,234,198,3,215,237,1
42,6,0,159,238,189,214,242,31,19
,166,132,39,69,67,16,39,0,154,16
,142,9,76,166,164,129,42,16,39,0
,15,161,192,38,48,16,140,9,83,39
,5,49
110 DATA 33,126,80,132,48,8,31,1
9,16,142,9,84,166,164,129,42,16,
39,0,35,161,192,39,4,48,24,32,13
,16,140,9,86,38,2,32,19,49,33,12
6,80
120 DATA 163,48,136,32,140,7,0,3
8,173,92,193,11,35,158,57,48,24,
53,64,189,165,73,52,64,52,4,52,1
6,198,8,189,185,162,189,205,27,1

```

```

98,3,189,185,162,189,205,27
130 DATA 230,0,193,10,16,36,0,3,
23,124,37,79,189,189,204,23,124,
30,174,228,134,66,171,12,23,124,
18,230,13,23,124,19,31,137,79,18
9,189,204,189,185,88,53,16,53,4,
32,166,57
140 '
150 FOR X=20539 TO 20762
160 : READ I
170 : POKE X,I
180 NEXT X
190 EXEC 20539
200 END

```

Listing 3: ALLRAM

```

10 ' THIS PROGRAM WILL PUT THE
20 ' COCO 2 INTO ALL RAM MODE
30 '
40 DATA 26,80,142,128,0,127,255,
222,166,132,127,255,223,167,132,
48,1,140,255,0,38,239,28,159,57
50 FOR A=&HE00 TO &HE18
60 : READ X
70 : POKE A,X
80 NEXT
90 EXEC&HE00:POKE 65503,0
100 END

```

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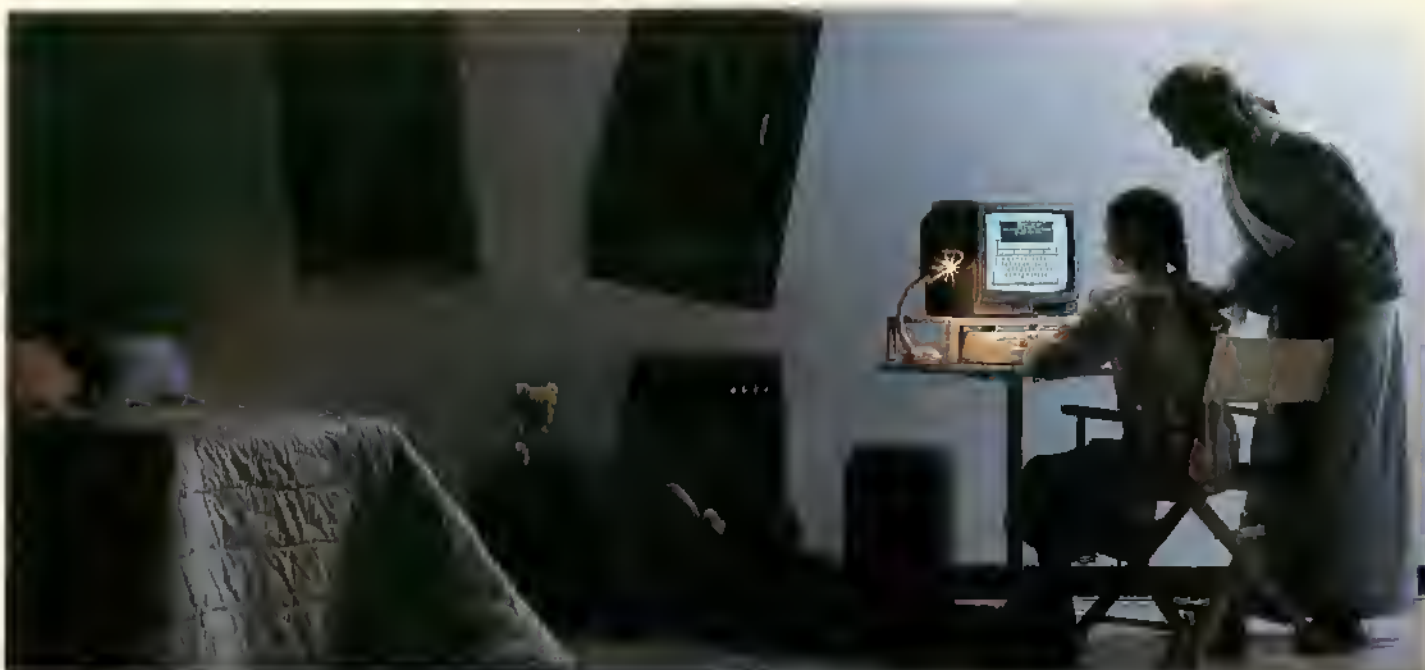
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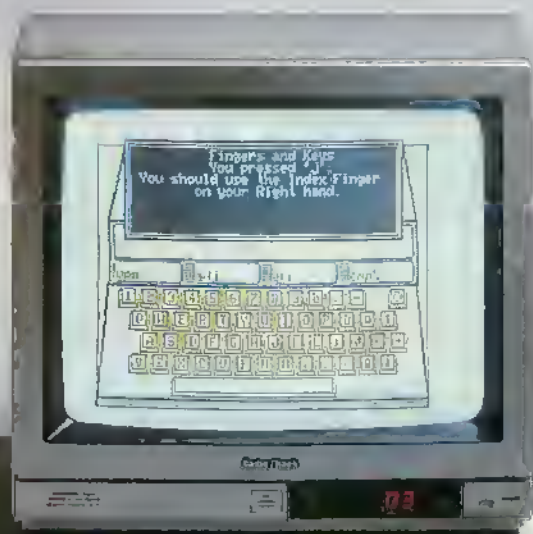
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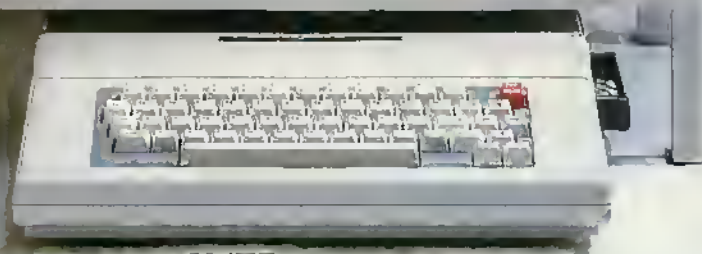
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Software

CoCo 3

Caladuril II— Weatherstone's End Passing on the Torch

If you've negotiated other role-playing, puzzle-solving games and think you have seen it all, this one's for you. In order to successfully finish *Caladuril II — Weatherstone's End*, you must have the crafty inventiveness of Leonardo da Vinci, the guile of an aborigine tracker, the mind of Rube Goldberg and the patience of Job.

This is not a difficult game. It is a ring-tailed, solid-gold near-impossibility. The "Scoreboard Pointers" department in *RAINBOW* can expect a flood of letters begging for advice and hints. The question is: Will there be anybody out there with answers? Those who know some of them can justifiably chortle with glee and congratulate

themselves on solving each diabolical puzzle that presents itself. Even if you never get to the game's end, there are plenty of obstacles you can be proud of solving.

The scenario seems standard: Olin, son of Jamerend, has been sent by the sages to recover the legendary Weatherstone on Lord's Isle. To do that, he must somehow overcome shipwreck, negotiate maze-like architecture, solve complicated puzzles and defeat the awesome power of Silmaoleh before returning the Weatherstone to its rightful place so that the disastrous weather can be stopped. Variation on a theme? Perhaps, but what makes *Caladuril II* so different are the absolutely sly and devious

puzzles. Nothing is useless. Almost every item has a purpose; many items can be combined and used together. Timing and paying attention to what happens when you do certain things are critical.

Above all, you must *think!* *Caladuril II* is not an arcade game where you mindlessly blast away at swarming enemies. It requires exercising every last ounce of creative brainpower you have. Even though not mentioned in the instructions, this could be an excellent game for two people to work on, either together or separately. As time passes (days or weeks), new ideas will suddenly arrive — maybe at inopportune moments when you can't immediately charge into your computer room and try them — which may, repeat *may*, be the answer to the one situation you've been mentally screaming about for so long.

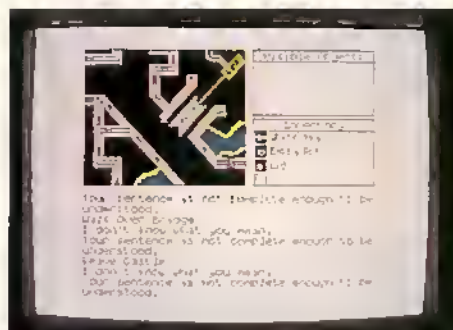
The game comes on two disks for the CoCo 3. You can back up the Play disk but

not the Boot disk. There is a one-year warranty, however. The instructions advise you to put a write-protect tab on the original Play disk before using the backup procedure. This is especially good advice if you're using one drive.

There is one slight catch. Due to certain proprietary routines, the game will not use the advanced features of a disk operating system such as ADOS 3 or a Disk BASIC-compatible hard disk DOS. Apparently it will still play on those systems but won't use their advanced capabilities. This doesn't strike me as a big problem.

If you mess up, there is a game-save option that I recommend you exercise often. Since the system allows only one game-save per Play disk, I recommend you make several Play disks. One really great feature is the "Concede" command. This allows you to return to the nearest non-critical point in the game in case you messed up big time, thus avoiding having to go all the way back to the beginning if you fall into the lava.

The instruction booklet also includes a short history of the Fall of Tarin, the events that led to today's current situation. Tolkien aficionados may note some close similarities in names (this lends to the overall atmosphere).



The graphics are terrific, thanks to the 256-by-192, 16-color screens and the number of graphics tiles. At least you have some nice, clear pictures to look at while you're pulling out your hair trying to solve the latest mystery. In fact, they are some of the best graphics to be seen on a CoCo 3 with RGB monitor. (Take a look at the lightning as only one example.) An RGB monitor isn't absolutely necessary, of course, but it certainly adds to the viewing pleasure.

The playing screen is divided into four sections: (1) the Play Screen (in color), where you maneuver the little figure that is

Olin; (2) the Visible Objects area, which explains exactly what you're seeing; (3) the Inventory and; (4) the Text and Command Area. At first it seems that the Play Screen could be larger, but after a few minutes you'll appreciate the other displays. Plus, the memory saved allows for much more involved scenery and more exotic objects.

You move Olin about by means of the arrow keys. By using two at once you can move him at various angles, which is itself a bit of a challenge, to keep him from

bumping into things. There are some very tight spaces in the tunnels.

Between moves, you type commands onto the screen, using one of the nearly 70 available verbs. All you have to do is figure out which ones work. There are instructions on how to tie two verbs together, using special linking words, but patience is a definite virtue while you're learning. Having a dictionary handy is probably a good idea.

Now for some hints and comments. The

The Two Behind the Triad

Oblique Triad, founded in March of 1987, was created to be a vehicle for owners/programmers Jeff Noyle and Dave Triggerson to write and play software of their own design. For their first offering, the game *Caladuril, Flame of Light*, the two left the marketing chores to another company. Now they are doing their own marketing, however, and have just come out with an exciting sequel to *Flame of Light*, *Caladuril II — Weatherstone's End*.

The game's concept, presentation format and actual programming was done by Jeff Noyle, who also designed the graphics and auxiliary items. Dave Triggerson worked out the disk I/O and translation of English commands into computerese.

Both partners are avid fantasy and science fiction fans, with somewhat differing tastes. However, they teamed together to produce quite an impressive computerized "alternative reality" package. Moreover, they've done their homework; when queried, they granted the similarity between the name *Caladuril* and *Galadriel*, stating that *Caladuril* is a combination of two Elvish words meaning "flame of light." (Before the really serious Tolkien students get upset about possible translation mistakes — don't fret about it. The combination serves the purpose well, and has a certain ring to it.)

Caladuril II is written entirely in machine code, using the double clock speed mode; Triad says that is the only way to get speed and smoothness on a CoCo 3. They also used 256-by-192, 16-color screens instead of 320-by-192 screens, which gives them some extra room on the Play disk to display certain objects up close when you look at them. It appears to me that they have used the CoCo 3's capabilities to the maximum possible while providing an enjoyable and intriguing game.

The company develops software exclusively for the CoCo. All current programs are for the CoCo 3, except one: *Caladuril, Flame of Light*. That one they've

decided to rerelease, and it is written for any 64K CoCo 1, 2 or 3 with one drive. If demand is heavy enough, they might develop more programs for the CoCo 2, but they consider the CoCo 3 to be the future. Although the bulk of their business is through mail order, they have had a few visitors and certainly don't discourage customers who want to drop by instead of using the mail.

To the two programmers, packaging and accompanying "goodies" are very important. *Caladuril II* has a large map plus a pouch of real "Power Stones" to give you the feel of the game.

The future? Next out is *The Seventh Link*, a role-playing adventure with multiple characters, multiple worlds and 3-D dungeons. In addition to the three program disks, it includes a 30-page manual with illustrations, two double-sided maps, a quick reference card, a burnt and blackened copy of a "last" log entry and — a strip of simulated superconductor wire. Any other items, such as liquid nitrogen, are up to you as you immerse yourself in the story line.

A sound digitizer/editor called *Studio Works* is also in production; linked with that is a hardware analog-to-digital converter under development. And they expect to have a CoCo 3-D *M*vable M*ness* type of game ready for the October RAINBOWfest.

Jeff Noyle and Dave Triggerson spent three years, off and on, programming *Caladuril, Flame of Light*. When that was complete, they began work on *Caladuril II*. Their own interest plus requests from buyers of the original game prompted them to take on that task pretty much full-time.

The company name? Oblique Triad refers to the three slanted color bars on top of your CoCo. Go ahead, take a look; they're there, aren't they? The company's declared aim is "to produce software packages that are the pinnacle of quality in their category; the best the CoCo has seen."

They are off to a terrific start.

A New Dimension in Alternate Realities

Manfred stood on the bridge's dark planks, his black bearskin battle uniform whipping in the cold wind shrieking through Skull Canyon. His heavy sword was already unsheathed and in his strong right hand. At the opposite end of the bridge, the foremost Plisn warrior stepped onto the scarred oak planking. "We meet again, demon-spawn," he shouted above the howling wind.

"We do indeed, Manfred of Arcsip." The foremost Plisn warrior, who had no name other than that given to him in fear by those he had defeated, smiled grimly through jagged teeth. "This time you will not escape me."

Manfred smiled in return. He had waited many planting seasons for this moment. He sensed a sharp-eyed presence: The archers of Kurultee were concealed in the dark woods behind him, sturdy bowmen ready to send their thrumming arrows into the lightly-armored Plisn hordes as soon as he raised his sword. He knew also that the cavalry from the ringed fortresses in Wuzoo would soon arrive, completing the elaborate trap he had so painstakingly calculated.

As he started to raise his sword, a blackboard filled with arcane, student-scribbled symbols appeared in his mind's eye. For an instant that froze time, he was once again Manfred Arthur Mueller, math teacher at Pasco High School. Then the image was gone, the wind had returned and he could sense bows bending as his sword rose higher.

Is this man suffering from a delusion or an inappropriate daydream? Nope, he's involved in what is now known as an "alternate

reality." That's the latest term for fantasy or science fiction where the hero or heroine is suddenly transported to another place, perhaps another time. Theories of parallel universes existing in uneasy coexistence with ours become a strange sort of reality as the adventurers flip back and forth between worlds while trying to right some terrible wrong or accomplish some mission given to them — often against their protests — by forces they don't understand.

Why this current fascination with alternate realities? Some believe that it's the ultimate form of escapism, in which people of ordinary talents and moderate courage can identify with people of extraordinary talent and courage (who also have pure hearts and just causes) — and alleviate some of the pressures in their lives.

Reading this type of fiction allows us to believe that if things really got tough, each of us would be able to dredge up the courage and strength to defend our loved ones and defeat the "system."

Stephen King, in his book *Danse Macabre*, examined horror movies and theorized that the movies reflected the greatest fears of their respective decade: mutations caused by radiation, alien invaders, illegal medical experiments and so on. By extension, many of our current fears seem to huddle around the idea that individuals are being smothered and buried in "the system's" lack of caring about us. So, stories that tell us about people who fought "The Evil Ones" (or City Hall!) and won are encouraging even though they are basically illogical and ignore the fact that, as Frederick the Great of Prussia wrote,

"God is always with the strongest battalions."

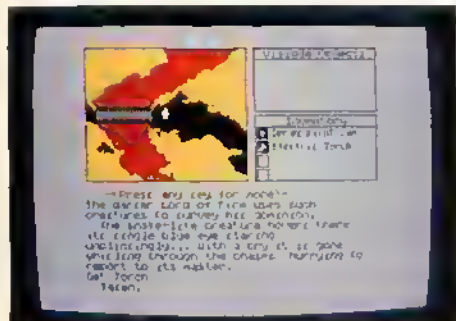
For those who want to get more closely involved in the process, there are computer programs that put you right in the middle of the whole mess. You have to solve various complex puzzles, accumulate what appears to be useless junk that turns out to be vital later on, decide which path to take in what is generally a maze designed by the Marquis de Sade on a bad day, and defeat a series of nightmarish monsters thrown into your path. This is what we call "fun." The advantage, of course, is that if you do get doused in watermelon-flavored acid, are shrunk to the size of a lemon drop, get carved up by a ravenous ogre wielding a door-sized axe or fall into a pit of highly-irritated aardvarks, you can always start the game again.

What an Adventure is not is totally relaxing. People have been known to become obsessed with games and play them for 72 hours straight. They then return to the job that caused the stress they were trying to escape in the first place and mutter strange phrases while taking notes about new ways to defeat the Moon Lord's deadly maze and rescue the princess. (If fellow employees begin to avoid you more than usual, you might be spending too much time in the Crimson and Gray Halls of Wazoo, Wally.)

On the other hand, the next time you take the golden locket to the third level in the Tower of Thingel's Doom, you just might figure out how to avoid the mirror's mindbending gaze and open the large mahogany chest.

You won't know unless you try, will you? ☐

description of an item is often a clue on how to use it. Don't forget to *look* at objects. Just remember that 99.9 percent of the objects are there for a reason.



For the mappers in the crowd, at least two of the areas in the game are not capable of being mapped by the grid-square method. The mine, for example, just wanders here

and there. The castle can be grid-mapped; it contains rooms in a somewhat logical sequence. However, the teleporters (the pulsing diamond shapes) will disorient you somewhat. Don't overlook anything; think how things could be used with each other.

The Teleport Maze, should you get that far, can be mapped somewhat if you account for the fact that . . . *huh-uh*. Figure that bit out for yourself. One portion of it contains 25 teleports, enough to please even the most jaded player — and that's only part of the maze. Later on you'll encounter massive, Lovecraftian architecture, as if you'd been brought to the dreaded and shunned island of R'lyeh. If your imagination is operating at full speed, you'll see what might be green ooze dripping

from those Cyclopean buildings, while a quiet but sinister voice whispers, "Cthulhu fhtagn."

So, if you combine elements of the Cthulhu mythos, the Ring trilogy, Tom Sawyer, the Scout manual and Hints from Heloise, you are ready to tackle *Caladuril II — Weatherstone's End*. Break out the notebooks, the Thesaurus, the graphing paper and pencils, turn your brain up to "high" and settle down for a long siege. You are going to be frustrated and dismayed at times, but you will have a real feeling of accomplishment every time you solve one of the enigmas.

P.S. Don't come to me for advice and hints. My descriptions of the various areas are based on the extensive help Oblique Triad sent me so that I could better evaluate

the game. They also swore me to secrecy. So from here on, you're on your own.

Good luck to you. It's going to be a tough but enjoyable journey.

(Oblique Triad, 32 Church St., Georgetown, Ontario, Canada L7G 2A7, 416-877-8149; \$32 US, \$38 CDN, \$2.50 S/H)

—John M. Hebert

Software CoCo 1,2 & 3

Kcal— Calendar-Generation for Your DMP-Compatible

Kcal is a hybrid (part BASIC and part machine language) calendar-generation program that allows you to print a calendar 7 inches high by 8 inches wide with your comments and notes inserted in the appropriate dates.

To use Kcal, you must have a Color Computer 1 or 2 with at least 32K of memory and Extended Color BASIC, or a Color Computer 3. Other equipment required includes a dot-matrix printer and a cassette or disk drive. I received the disk version.

Once booted with a RUN "KCAL" statement, a menu appears that gives you the option to load, save, edit or print a file. There is also a "quit" option.

Kcal is very easy to use; the 18-page manual is well-written and quite explanatory — it even has a "Hints and Help" section and a "Notes" page.

I consider the Edit File function to be the heart of the program, for here is where you will spend the most time. Upon entering

*"I have seen many
appointment-maker
and a few
calendar-maker
programs in my
computer experience,
but I think Kcal has
them all beat. . . ."*

this option, you are prompted for the year you want to view. The calendar-generation calculations are based on January 1, 1988, so you can view only the years from 1988 forward. After you choose the year, you are asked which month of that year you want. Pressing only the ENTER key will return you to the year prompt. Once you select a month, a calendar for that month appears on the screen. Moving a cursor up, down or across the month, you can stop on any date, enter a message consisting of three lines with up to 15 characters each, then move to another date or return to the month or year prompts.

The Print File option outputs a calendar to your printer in a 7-by-8 inch format. The size is nice, and the calendar is easy to look at, in standard calendar format with the month spelled out at the top followed by the year, both in expanded print. The days of the week are spelled out across the top of the "date-box" columns, with each "date-box" being approximately 1 inch square. Your message for a date, if any, is printed at the bottom. There is enough room for you to write notes at a later time, such as for a doctor's appointment or dinner engagement.

I experienced no problems using any of the program's functions. Kcal is very user-friendly. (Although there is no way to set your printer's baud rate from inside the program, you can do this before running Kcal.) I was inserting and editing messages within a few minutes of running the program. I actually found myself having fun as I retrieved my commercial-type calendar from the dining room and began entering special dates, federal holidays and friends' and relatives' birthdays.

I have seen many appointment-maker and a few calendar-maker programs in my computer experience, but I think Kcal has them all beat, especially when it comes to performance and the bottom line — price. It's hard to find a better deal for your DMP-compatible, although it would be nice to be able to use this program with other printers.

(King Cottage Industries, 1814 Valley St. NE, Poulsbo, WA 98370, 206-697-5576; \$6: First product review from this company appearing in THE RAINBOW.)

—Richard L. McNabb

Software CoCo 1,2 & 3

Hard Drive Utilities— Support for Hyper-II/O

More and more CoCo owners are purchasing hard drives these days, turning their already powerful systems into super-powerful setups. And it seems that nearly all of these hard drive owners are using the Burke & Burke Hyper-II/O operating system. New users quickly learn that hard drives

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can easily become cluttered, overflowing with files. Finding that one file you need can become a real undertaking — taking hours, if not days, to unclutter a hard drive system. *Hard Drive Utilities* was written with these *Hyper-I/O* users in mind.

Before you attempt to run this software you must first have *Hyper-I/O* booted in memory with the correct drivers loaded. The software will operate on a CoCo 1, 2, and 3 with at least 64K of memory, Disk BASIC and Extended Color BASIC. The main program is completely commented and easy to modify if you want to custom-design it to your system.

Hard Drive Utilities is a piece of cake to boot — simply run `HOUTIL.BAS`. After you run it, a menu of options will appear (you choose an option simply by pressing its number). The options will let you back up device to device, back up to floppies, restore from floppies, search/copy/rename/kill files and more.

These options are self-explanatory, and they all offer the hard drive user helpful utilities. I especially liked Option 3, Backup Hard Drive to Disk. The advantage of this option over other look-alike software is that every sector of a floppy disk is used; the files are backed up in a compressed format. This allows maximum storage per floppy for your system. The compressed files backed up to disk cannot be read normally by BASIC until they are restored to the hard drive under Option 4. It is not necessary to back up the entire hard drive; you can back up just a specified section. This is a fabulous feature. Many times I only want one area of my hard drive backed up.

Another super feature of this software is its ability to use wildcard filenames. So, if you need to search for a file but you can't remember the exact spelling of its filename, the wildcard feature can be a big help.

Hyper-I/O users whose hard drives are stuffed full of files will really appreciate this software. It operated efficiently on my 30-Meg hard drive, searching for files. I used *Hard Drive Utilities* on both my 64K CoCo 2 and on my 512K CoCo 3, but the software didn't even know the difference between the two machines. It would have been nice if the author had distinguished between the CoCo 2 and the CoCo 3 so that CoCo 3 users wouldn't have to endure the 32-column screens.

The software is delivered on a 35-track floppy disk with seven pages of

documentation, and the disk is not copy-protected. If you're pulling your hair out trying to find lost files within your hard drive, *Hard Drive Utilities* is just what the doctor ordered.

(KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, 407-799-3253; \$21.95 plus \$1.50 S/H: First product review from this company appearing in THE RAINBOW.)

—Brian R. Smith

Software

CoCo 1,2 & 3

The Black Grid— Riddle of the Black Box

Logic puzzles — they drive me crazy! I once helped a friend get revenge on a Rubik's Cube by blowing it to kingdom-come with a 30-30! Really! I'll show you the video tape.

Well, despite that, I keep buying them. I own several logic games for my CoCo 3, but none of them have caused my hair loss to accelerate as quickly as *The Black Grid* from SPORTSware.

The game is played on an eight-by-eight grid by a single player. You use the joystick to place yourself (the cursor) at the end of a row of blocks and shoot an invisible ray down the row, trying to locate hidden targets. There can be from two to nine targets hidden, depending on the difficulty level selected. The object is to find all of them in as few shots as possible. One of four things can happen on each shot: a hit, a detour, a reflection or a clean miss.

Hits and reflections produce a single marker where you are standing, while misses and detours produce two markers, one where you are standing and one at the point where your ray exited the grid. From these markers, you must deduce the locations of the hidden targets in the grid. When you think you know where one is, place your cursor on the block and press the firebutton to mark it. You can change your mind at any time until you actually end the game.

Are you unimpressed? Does this sound too easy? Let me warn you, don't underestimate this puzzle. At the higher levels, this could make the preacher cuss!

Oh, sure, with only two or three targets,

it's fairly easy to figure out where they are hidden. At four and five that ray starts to bounce around inside the grid a little. At six and seven, you'd better have some coffee ready because you're going to be up for a few hours. At eight and nine it might be time to switch from coffee to something a bit stronger. It's not impossible for the ray to bounce around in the grid and exit through the block right next to where you are standing — and hit absolutely nothing. It's also possible for the ray to be fired from the upper-left corner and register a hit on a target that is hidden in the lower-right corner. Since you can't fire diagonally, that may sound quite impossible. I assure you, it's possible. I've been there!

Once you've decided where you think all the targets are, press the E key and they will be revealed to you. You will be charged 10 penalty points for each wrong guess.

The game, and I use that term loosely, is played on any CoCo 3 using the Shack's regular or deluxe joystick. Don't try Atari sticks with an interface; they won't work. The program arrived on disk with no indication as to whether a tape version is available. I would hope that tape is available since some newer CoCoNuts don't have drives yet, and I would hate to see them miss out on this.

Two practice games are included as a tutorial to help you learn the rules. Study them — you'll need them later.

When you register a miss or a detour, two markers are generated, one at each end point. When another miss or detour is registered, two more markers of a different color are generated. This makes keeping track of individual shots a breeze.

At the higher levels a "peek" feature is included to let you sneak a peek every now and then. Use of the peek feature costs you points, so use it sparingly!

Instructions for play are also located right in the program. This makes it very difficult to misplace them. I always like to have hard copy of program instructions, but in this case that may be impossible. Game play is easier to understand by using the tutorial rather than looking at a diagram. The only necessary instructions are printed right on the disk: RUN "BLK GRID".

The Black Grid does not have a lot of "bells and whistles." It doesn't need them. With this type of game they only get in the way.

The only fault, if you can call it that, is that joystick control is somewhat sensitive.

If you move the stick too quickly you'll find yourself jumping all over the grid. This is due mostly to the limitations of the stick itself, not the program.

A couple of things should be noted if you are considering buying the game. At the higher levels especially, the game may be too difficult for the younger set to play. This is a thinking person's game all the way, and there are too few of this type around. You really have to think!

Also, you will probably need to take time to study the in-program instructions and go through the practice games. If you don't, it's easy to become confused by what those little markers are telling you.

The Black Grid sells for \$21. If you enjoy pulling your hair out over logic games, spend the money. You'll be bald in no time.

(SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, 419-389-1515; \$21)

—William Baird

is then drawn in PMODE 3 graphics. This screen contains the scaffold, an area for the letters you guess and an area for the word to be guessed. Every letter you enter is displayed onscreen to save you from making the same choice twice. If you do choose a letter already given, the program notifies you of this.

Correctly guessing the word results in a rendition of the song *I'm an Old Cowhand From The Rio Grande*. If you run out of guesses, *The Ballad of Tom Dooley* is played. Either way, you get to see the word you were trying to uncover.

Now for the utilities.

The BASIC program REDIT allows you to create your own list of words. A word file can hold up to 500 words of one to 20

letters each. REDIT loads and executes the file FSORT, which handles the majority of the input/output needed to create a word list.

Another available option lets you check for exact duplicates of words in a file. The manual states that this procedure takes about 10 minutes, but checking a file of 500 words with three duplicate words on my 64K CoCo 2 took less than three minutes. You can also print or edit a word file.

I had the opportunity to talk to the author of this program, and he brought to my attention a fatal error that can occur when using REDIT and inserting words into a file. This error occurs if the user accidentally enters a non-alphabetic character into the word list. (The manual

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Software

CoCo 1 & 2

Rustler— Word Games at the Scaffold

Rustler is a Hangman-type game written in BASIC for CoCos 1, 2 and 3 with at least 32K of Extended BASIC. Cassette and disk versions are available. As everyone knows, Hangman is a game in which players try to guess the letters to a word without hanging their "man."

Rustler comes with a file called WORDS, which is a list of 500 words from which the program randomly chooses words for play (but never the same word twice in one play). Other files included are three utilities: FSORT, a machine language program, and REDIT and RCOPY, two BASIC programs. We'll talk about these utilities later.

Upon loading and running *Rustler*, you are greeted by the title screen and a song that plays for a short while. The screen changes after the song and you are asked for the filename of the file that contains words you want to use.

When the word file has been located and loaded by *Rustler*, the playing screen

warns you not to try to enter numbers or special symbols.)

RCOPY is used to back up the machine language program, FSORT.

Some people might think *Rustler* would be too simple a game for them. But let me tell you, as a 33-year-old, that I found *Rustler* to be quite challenging at times and also fun to play. So did my wife and our daughter. Trying to guess words with 20 characters is hard enough, but a lot of games were also lost trying to guess words with only three characters, and I still have not gone through the whole 500-word list.

Rustler and its accompanying programs are very user-friendly, and the author seems to have thought out each program well. I myself am looking forward to more programs from this company. *Rustler* is an excellent value.

(King Cottage Industries, 1818 Valley St. NE, Poulsbo, WA 98370, 206-697-5576; \$5; First product review from this company appearing in THE RAINBOW.)

Software

CoCo 3

Chess-Nuts— Chess on a Shoestring

Chess-Nuts, the new program offered by Mousesoft Software for the Color Computer 3, requires a disk drive and RGB monitor. It is a chessboard simulator rather than a game in itself. No rules of chess are implemented, including the basic one that white always moves first, and no concession has been made for a player who wants to take on the computer. Also, the game does not supply the rules of chess, nor does it cancel illegal moves.

The software is loaded by entering the LOADM "*" command. Once the game has been loaded, it executes automatically—a nice touch. A Set/Reset graphics title screen appears, and then the program switches to the CoCo 3's Hi-Res graphics. The program presents a menu and offers options for going to the board screen or exiting from the program. The graphic representation of the chess pieces is sharp and accurate, but this benefit would be lost without the RGB monitor. Those with a TV or composite monitor would not appreciate the software because the colors would not be correct, and the 80-column

text, which is all that is utilized, would not be legible.

Play commences when the coordinates for a piece are entered. The piece disappears and returns to the screen when the second set of coordinates is entered. Coordinates are presented in a fashion similar to those in the game Battleship. The columns are numbered one to eight, and the rows are labeled A to H.



One nice feature of the program is the ability to replace a piece on the board. This comes in handy when an opponent captures one of the pieces either intentionally or accidentally. Simply specify the color, piece and position, and it returns to the screen. This convenience is also useful when the player needs to promote a pawn that has reached the opposite end of the board. Pieces can replace those already in play.

The program's manual is a small pamphlet that slides into the disk jacket—a useful location for preventing the loss of the instructions. The information is adequate for loading and playing. The text is easy to understand, requiring only a brief viewing before playing a game. Someone can run the program in five minutes, ready to challenge a friend to a quick round of chess. A game save feature lets users carry on prolonged games.

The program is simple to operate but lacks many features that could have been included. The price of this game is \$19.95—relatively steep for a CoCo program of this caliber. People looking for a computer program that doesn't require another player should look elsewhere. However, if you want a computerized version of a chess game that is ready to play against an opponent (and allows cheating), then *Chess-Nuts* is a good deal.

(Mousesoft Software, P.O. Box 18038, Milwaukee, WI 53218, 414-466-3617; \$19.95; First product review from this company appearing in THE RAINBOW.)

—Fred Miller

Software

CoCo 1, 2 & 3

Floppy Filer— Keep Your Files Organized

My computer time is precious to me. After all, there are only so many hours in a day, and I can't spend *all* of them in front of the computer. That's why I hate to misplace a program. I want to spend quality time with my computer; I don't want to spend valuable minutes trying to remember which floppy holds the application I need to complete a project. I need to know where everything is when I need it. I need to keep my disks organized.

That's why the program *Floppy Filer* is perfect for me. The program, which runs on any CoCo, creates an alphabetized list of all of your disks. When you run the program you are presented with the following choices, which are selected using the up and down arrow keys:

- 1) Input Disk Directory
- 2) Sort List
- 3) Save List to Disk
- 4) Load List from Disk
- 5) Print List
- 6) Set Parameters
- 7) Quit

The first time you run the program, you will want to choose Option 6, Set Parameters, first. This option lets you enter the default drive and the printer baud rate. You can change the default drive and baud rates easily.

Once you have entered the defaults, Option 1, Input Disk Directory, asks for a one- to seven-character identifier (name) for the disk in the drive. The program then reads the disk's directory and stores the directory in the computer's memory, so you won't have to replace the program disk after each directory is read. The program sorts according to filename, and it takes four minutes to sort a maximum of 1150 files. A message is displayed if you reach the maximum file limit. You can then save the current list and begin a new one. When the list is saved to disk, the data file has an extension of .FPF.

When loading a list from disk, the

program will display a "File not Found" message if the name of the file entered can't be located. If this happens, you are prompted to re-enter the filename.

If you send the data to a printer, the information is printed in three columns, each containing the filename and extension followed by the disk identification. When you print to the screen, you can return to the menu rather than listing all the files.

Before ending a session, the program will verify that you really want to quit. If you didn't want to quit, it will return you to the menu. If you have a CoCo 3, you should either reboot or turn off the computer after using it because some commands won't work after ending the program.

Floppy Filer is written in BASIC but includes a machine language sort. The disk is not copy-protected, so you can (and should) make a backup for your own use. The thorough instructions are supplied in an eight-page booklet.

I liked *Floppy Filer*; it's functional and easy to use. The program can help you avoid hours of frustration when you try to locate an elusive program. If you want to organize your floppies and make your

computer time a little more efficient, then this program is for you.

(Gregory Software, Box 573, Kirkland, IL 60146, 815-522-3593; \$8: First product review for this company appearing in *THE RAINBOW*.)

—Lee Deuell

Software

CoCo 3

Wargame Designer Icon Disk #1— A Strategist's Tool

"Front rank... Fire!" Crack! "Rear rank... Fire!" Crack! "Front rank... Fire!" Crack!

The Zulus stopped momentarily as the volleys tore into their ranks, then came on again. And again, but bravery was no match for rifles and the disciplined British Army. This time. There was also, after all, the Battle of Isandhlwana — the British Army's version of Custer's Last Stand.

SPORTSware's *Icon Disk #1* is out, wargamers. You can recreate the Battle of Rorke's Drift with one of the eight terrain/units sets. You need a CoCo 3, a disk drive and the *Wargame Designer* package (see the August 1988 review of *Wargame Designer*). The neat part is that you don't really need any artistic talent, which was a great comfort to me. Oh, sure, you can modify the available symbols/graphics just as you can on the original *Wargame Designer* system. In fact, I've already modified the standard military symbol for self-propelled artillery. Piece of cake.

"This icon disk is for the serious wargamer, one who knows what happened at Rorke's Drift, during the Wagonbox Fight or at the second Battle of Tobruk."

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ULTRA-BASE

The ultimate database program for the CoCo 1, 2, or 3 with at least 64K.

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ULTRA-CAT

Organize your program collection in a fast and nearly effortless manner. Simply insert one of your program disks into the drive, and ULTRA-CAT reads them and creates a 7-category ULTRA-BASE file describing the contents of that disk. Keep a separate file for each of your disks, or merge all of the individual files into one massive file containing information on about 1000 different programs - and this entire file can be in memory at one time! Then, using the powerful sorting, editing, and printing abilities of ULTRA-BASE itself, you can have the most organized program collection in the country. Requires at least 64K.

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There is no instruction booklet. You don't need one, either. All the help you need is contained in the one-step-at-a-time menu, plus your basic knowledge of the *Wargame Designer* system, undoubtedly learned from juggling the odds on your attacks against Moscow. The instruction booklet that comes with *Wargame Designer*, as you already know, gives you the modification and design techniques.

The two-sided disk has a total of eight unit/terrain sets, plus palette color files. The sets include the following:

1. humans, elves (spelling *a la* Tolkien) and Orcs
2. standard military symbols (U.S. Army type)
3. humans and ghosts (plus things that go bump in the night)
4. robots
5. desert armies (8th Army and Afrikakorps?)
6. British and Zulus
7. adventurers (and adventuresses)
8. Cowboys and Indians

You don't need to start from scratch to view both sides of the disk. While in the Examine Icons mode on one side, just flip the disk over before returning to the main menu. Since you're not dealing with a picky OS-9 setup, CoCo could care less about the data or execution directory.

Once you've chosen which set to use, transferring it to a game disk is ridiculously easy. The series of menus and steps prevents all goofups except deliberately premeditated acts of electronic *hara-kiri*. OK, so now you've got a whole new set of icons on a game disk. Simply consult the *Wargame Designer* booklet on building a new game, using the regular steps to assign terrain features and units. This is now the time to modify the icons to suit yourself.

You should do this on a spare gaming disk, that is, one that you *meant* to transfer the new icons to and intend to change the map and scenario on. Otherwise, if you start to play a previous game, you are going to have a very strange-looking map. Even the newest Tolkien recruit is not going to mistake the terrain around Moscow for Minas Tirith or the Pelennor Fields.

SPORTSware says that newer versions/scenarios of *Wargame Designer* will use a joystick to control menu selection and play. While this will be handier than plunking away at the keys, hopefully we'll

be allowed an option. There are a lot of us clumsy oaves out here who have trouble with joysticks. Of course, "oaves." If that rule works with elves and loaves of bread, why not for the plural of "oaf"?

This icon disk is for the serious wargamer, one who knows what happened at Rorke's Drift, during the Wagonbox Fight or at the second Battle of Tobruk. It's especially useful to the graphically inept wargamer, who is sick and tired of trying to draw his or her own symbols and having them look like somebody crawled inside the monitor and got crazy with a blunt crayon. By the way, you can also print out an "inventory" of each set for future reference and note-taking when you're recreating a battle.

On the other hand, if you don't already have *Wargame Designer*, the *Icon Disk #1* won't do you a bit of good unless you like looking at excellent graphics for their own sake.

My only suggestion would be to add the capability to move the unit icons or terrain icons or both, just in case some of us do want Orcs and elves at the Battle of Moscow.

Bottom line: an excellent buy.

(SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, 419-389-1515; \$15)

—John M. Hebert

Software

CoCo 3

Digitizer 3— Collect a Library of Sounds

Sound digitizing has been around for a long time, and in different forms, from early radio and phonograph records to laser discs and sound synthesizers. Now the CoCo can digitize sound with a program like *Digitizer 3*. *Digitizer 3* digitizes sound "samples" from a radio or tape recorder. A "sample" is just what you'd think — a segment of a sound and not the whole thing.

After a very colorful bootup, you press the BREAK key to begin. The word "digitize" issues from the monitor or TV speaker. Only if your right joystick is plugged in can you continue with the program and

make selections from the menu. (Here's an important hint the directions neglect to mention: You must keep your printer turned off, or you will have printer garbage every time you play back a sample.) *Digitizer 3* uses the speed-up poke to ensure that the digitized sound is crisp and clear.

From the main menu selection you can choose Option 1, "Test Tape," to hear what a taped recording would sound like digitized. The second selection lets you actually digitize a sound sample. The third selection lets you play back your digitized sample or a sample you loaded in. Selections 4 and 5 save and load samples. Selection 6 lets you view the directory.

To load a sample you have to type in your selection. (Since the program is joystick-driven anyway, it would be nice if you could use the joystick to choose the sample you want from a directory.) The documentation is fair.

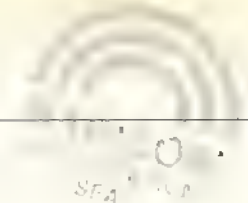
Digitizer 3 lets you choose "delay" and speed of your sample, both in recording and playback. The faster the speed you use to record the sample, the higher the quality (think of the three recording speeds on a VCR: The slower speed yields more recording time but at the expense of quality; conversely, the higher speed yields higher quality but less recording time).

With this program you can have fun digitizing various samples of instruments, voices or any recorded sound, even from the radio. It would be nice, however, if you could make the samples a lot longer and somehow incorporate them into other programs for special effect (Those who know their way around a piece of BASIC code may be able to do this).

As an ex-music teacher, I would appreciate having much longer samples and being able to digitize a whole song or piece of music and then record it back onto tape, from which it could be played through a stereo system. Of course, sound digitizing programs are memory hogs — a digitized sample can easily build until it expands beyond what memory and storage devices can hold. But this program is good for what it does, generating short samples of digitized sounds.

(DSD Software, 12 Undercliff Drive, Scarborough, Ontario M1M 1A5, 416-267-8920; \$12.99: First product review for this company appearing in THE RAINBOW.)

—Hadley Hazen



The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

CC3Flags, a one- to six-player game of world conquest for the CoCo 3. The goal is to employ your armies to conquer all the territory you can. It uses the CoCo 3's 16-color screen and features keyboard or joystick control. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; \$21.*

CoCo 3 Game Disk, a menu-driven collection of 10 Hi-Res board-type games written in BASIC for the CoCo 3. The games come in three categories: "brain" games (*Up Top, Letters and Swap*); puzzles (*Daisy, Numbers, Switch and Squares*); and two-player games (*Trap3, Indian Giver and Hounds*). For the CoCo 3 and a disk drive. *Aftanonow Software, 46 Howe St., Milford, CT 06460, (203) 878-3602; \$10.*

CoCoRun-12, a program that does "pseudo multitasking" of CoCo 2 programs. The programs to be managed by *CoCoRun-12* cannot modify the BASIC ROMS — *CoCoRun-12* assumes you are always in all-RAM mode. *CoCoRun-12* is incompatible with programs that require 64K (which means they do a ROM/RAM switch). Requires a 512K CoCo 3. *Roger Hallman, 2150 S. 32 St., Milwaukee, WI 53215, (414) 383-1532; \$19.95.*

DIR-MGR+, a disk directory management program that backs up the current directory to an unused granule, writes the backup to Track 17, repositions a filename in a directory, inserts "dummy" filenames, and kills or renames files. Hard copies of the directory can be printed in two or three columns. Requires a 64K CoCo 1, 2 or 3 and a disk drive. *Mike Forrest, 14030 Peyton Drive, #203, Dallas, TX 75240, (214) 235-0256; \$14.95.*

Disassembler, a program that will disassemble files with a starting address greater than or equal to 15000 (3A98 Hex — can be offset) and an ending address less than or equal to 27600 (6BD0 Hex). Outputs in decimal or Hex. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; \$5.*

Foods II, a program that prints out your daily and average intakes of protein, carbohydrates, fat and calories after you input one or more days of what you eat from a list of 181 foods. Comes on tape or disk for 64K disk systems or 16K cassette systems. A printer capable of printing 90 columns is required. *Mike Forrest, 14030 Peyton Drive, #203, Dallas, TX 75240, (214) 235-0256; \$14.95.*

King's Quest III: To Heir is Human, the next installment of the *King's Quest* series for the CoCo 3. For years the evil wizard Manannan has been kidnapping young boys to be his slaves, then slaying them before their 18th birthdays, when invariably they begin to think of escape. Now it is you who is approaching an 18th birthday. Can you secretly learn magic and outsmart Manannan? The program comes on five disks for the 512K CoCo 3; hard drives are supported. *Sierra On-Line, P.O. Box 485, Coarsegold, CA 93614, (209) 683-4468; available at \$34.95 from Tandy Express Order, (800) 321-3133, No. 26-3285.*

KJV37, the books of Galatians, Ephesians, Philippians, Colossians, I Thessalonians and II Thessalonians of the King James version of the Bible on disk in ASCII format for CoCos 1, 2 and 3. The text can be imported into a word processor that supports ASCII. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; \$3.*

Leisure Suit Larry in the Land of the Lounge Lizards, a 3-D animated game that features Larry, 40 years old and single (and a bit of a nerd), just looking for the kind of girls his mother warned him about. The player becomes Larry for a night, making the rounds of bars, casinos and discos, propositioning women, trying to lose his . . . nervousness. The characters "walk, talk, and even ignore your best pickup lines." Requires a 512K CoCo 3 and a disk drive. *Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614, (209) 683-4468; \$39.95.*

Lister, a program for owners of the Smith-Corona L-1000 Daisy-Wheel printer that lets them print out BASIC listings. The program to be listed must be saved in ASCII on Drive 0. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; \$5.*

Menu Maker, a program that lets users design menu screens and then writes a BASIC program to display that screen. The resultant program also supports menu choice selection and contains simulated subroutines for each selection. *Gregory Software, Box 573, Kirkland, IL 60146, (815) 522-3593; \$8.*

Nine-Times, a bimonthly magazine on disk devoted to OS-9, containing articles, reviews, programs and their documentation. Requirements include a CoCo 3 with 128K or 512K, a disk drive and OS-9 Level II. *JWT Enterprises, 5755 Lockwood Blvd., Youngstown, OH 44512, (216) 758-7694; \$34.95 for one-year subscription.*

Peninsular War, a one-player strategic simulation of Wellington's peninsular campaign against the French during the Napoleonic War of 1805. The player takes the part of the British commander defending Spain against the computer-controlled French force. For the CoCo 3 and a disk drive; RGB monitor recommended. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; \$21.*

Wargame Designer II, an upgrade to a military strategic construction set that includes the Wargame Designer game design system and four ready-to-play scenarios. New features include a new menu system, a new icon editor, default values for all modifiers and unit attributes, and the addition of joystick control in all modules. Users create their own scenarios, armies and battlefields. For a CoCo 3 floppy disk system. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; \$25.*

First product received from this company

The Seal of Certification is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the program does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

—Lauren Willoughby



A print utility for OS-9

PR.B09

By Richard Ries

OS-9 is wonderful. It is small and light as an operating system, and quite useful once you've learned the ropes. But many times when I list a program, I find a line of code sitting on a perforation, so I wrote PR.B09, a print utility that:

- 1) Titles each page
- 2) Skips over perforations
- 3) Indents BASIC09 listings
- 4) Converts too-long lines into right-sized ones
- 5) Splits compound lines into multiple lines
- 6) Puts an extra form-feed in at the end of the listing to make tearing the paper off easier.

The program, once written and packed, is invoked from the OS-9 prompt:

```
pr("your_file_path")
```

To run it as a background task, use:

```
pr("your_file_path")&
```

Or it can be run from BASIC09 with:

```
run pr("your_file_path")
```

The Listing: Pr

```

PROCEDURE pr
  (* print BASIC09 files with pagination *)
  (* and indentations. *)
  (* USAGE:
  (* "pr(pathname)" #...
  (* -if just "pr" is typed, a usage message *)
  (* be shown *)

  ON ERROR GOTO 130

  PARAM filename:STRING[24]

  (* declare variables *)
  DIM xx:INTEGER
  DIM slash:INTEGER
  DIM init:BOOLEAN
  DIM indent:BOOLEAN
  DIM yy:STRING[2]
  DIM jump:STRING
  DIM dayt:STRING[12]
  DIM linein,temp:STRING[256]
  DIM linecount,pagcount:BYTE
  DIM disk,printer,pointer:BYTE

  (* declare constants *)
  DIM MAXLINE:INTEGER
  DIM PAGELEN:INTEGER
  DIM FF:STRING[1]
  DIM LF:STRING[1]
  DIM DQ:STRING[1]
  DIM DOUBLE:STRING[1]
  DIM SINGLE:STRING[1]

  (* Assign values *)
  (* max chars. per line *)
  MAXLINE:=70
  (* max lines per page *)
  PAGELEN:=66
  (* form feed *)
  FF:=CHR$(12)
  (* line feed *)
  LF:=CHR$(10)
  (* double quotes *)
  DQ:=CHR$(34)

  (* GEMINI PRINTER CODES
  (* DOUBLE- width print
  DOUBLE:=CHR$(14)
  (* GEMINI PRINTER CODES
  (* single- width print
  SINGLE:=CHR$(20)

  (* initial indent length *)

```

Richard Ries is an electronics technician who integrates hardware and software at work, and programs at home.


```

02B4      jump:="      "
02C0      (* no indentations, yet *)
02DA      indent:=FALSE
02E0      (* this is the first time through *)
0304      init:=TRUE
030A
030B      (* set up date *)
031C      RUN date(day)
0326
0327      OPEN #disk,filename:READ
0333      OPEN #printer,"/p":WRITE
0340
0341      (* loop until file is done *)
035E      WHILE NOT(EOF(#disk)) DO
0369          (* get line *)
0377          READ #disk,linein
0381
0382          (* remove line feeds to prevent double- spacing *)
0385          REPEAT
03B7              pointer:=SUBSTR(LF,linein)
03C3              IF pointer<>0 THEN
03CF                  temp:=RIGHT$(linein,LEN(linein)-pointer)
03E0                  linein:=LEFT$(linein,pointer-1)+temp
03F3              ENDIF
03F5          UNTIL pointer=0
0400
0401      (* is this the first page? *)
041E      IF init THEN
0427          GOSUB 120
042B          init:=FALSE
0431      ENDIF
0433
0434      (* is this a new procedure? *)
0452 100
0456      IF LEFT$(linein,9)="PROCEDURE" THEN
046E          (* yes- mark it *)
0480          linein:="*** " + linein
0490      ELSE
0494          (* Is it a line number?  Comments are indented, too *)
04CA          IF LEFT$(linein,1)>"9" OR LEFT$(linein,1)="(" THEN
04E5              (* is there a key word? *)
04FF              IF LEFT$(linein,2)="IF" OR LEFT$(linein,3)="FOR" OR LEFT$(
                    (linein,4)="LOOP" OR LEFT$(linein,5)="WHILE" OR
                    LEFT$(linein,6)="REPEAT" OR LEFT$(linein,6)="EXITIF"
                    THEN
053A                  (* if so, then indent *)
0572                  indent:=TRUE
0578              ENDIF
057A              (* is it an END- word? *)
0593              IF LEFT$(linein,3)="END" OR LEFT$(linein,4)="NEXT" OR
                    LEFT$(linein,5)="UNTIL" THEN
05C2                  (* decrease indent size if not "END" *)
05E9                  IF LEN(linein)>4 THEN
05F6                      jump:=LEFT$(jump,LEN(jump)-2)
0606                  ELSE
060A                      (* reset the jump length *)
0625                      jump:="      "
0631                  ENDIF
0633              ENDIF
0635              (* if the word is "ELSE" then decrease indent *)
0665              (* size, and indent after the line is printed. *)
0696              IF LEFT$(linein,4)="ELSE" THEN
06A9                  jump:=LEFT$(jump,LEN(jump)-2)
06B9                  indent:=TRUE
06BF              ENDIF
06C1
06C2              (* add indent to input line *)
06E0              linein:=jump+linein
06EC          ELSE
06F0              (* we got a line number *)
070A              pointer:=SUBSTR(" ",linein)
0716              (* add some spaces *)
072B              temp:=LEFT$(linein,pointer)+jump

```

Constants are declared at the beginning of the program. The printer codes are for a Star Gemini 10 and are listed in the initializing portion of the program. If your printer uses other codes, replace the ones there with the ones you need. (They should be in your printer's manual.)

"Control words, such as For, While or Repeat cause an indentation on the next line. The end words like Next, Endwhile or Until cause 'outdentation'."

How it Works

PR. B09 is commented, so you can follow the program's details. One of the first lines, even before the parameter declarations, is the error-trapping line. This allows you to type in the program's name alone, and the program tells you how to use it. PR. B09 reads a line from a file and looks for certain words and symbols. If one is found, the line is adjusted as necessary, then printed. Comments, remarks and quotes are skipped over. Lines with backslashes (\) are split at the backslash.

Control words, such as For, While or Repeat cause an indentation on the next line. The end words like Next, Endwhile or Until cause "outdentation". If the line is too long to fit on the printer, it is split at the last available space. The first part is printed, the remainder treated as a newly input line. This repeats until the line is less than the maximum line length. After all lines are printed, the program goes to the end of the page and sends out a form feed to allow a tear at the perforations.

PR. B09 shows one of the nice things about OS-9. If you don't like the way something works, you can write a program to replace it.

(Questions or comments concerning this program may be addressed to the author at 361 Deauville, Blvd., Copiague, NY 11726. Please be sure to enclose an SASE when requesting a reply.)

Using OS-9 Programs on RAINBOW ON DISK

One of the most common questions we encounter daily is "How do I boot the OS-9 side of my RAINBOW ON DISK?" This is a very broad question, indeed. It entails several aspects of OS-9, many of which are not readily apparent to the novice user.

First, the OS-9 side of RAINBOW ON DISK is *not* bootable. That is to say, the disk does not contain any of the OS-9 system files necessary for operation under OS-9. In order to use the OS-9 files on RAINBOW ON DISK, you must first purchase the OS-9 operating system from Radio Shack. Then you must boot the operating system according to the instructions in the OS-9 manual.

Let's travel this tangent for a moment — it is somewhat important to understand the situation. The OS-9 operating system for the Color Computer is available only from Radio Shack and its authorized dealers. To the best of my knowledge, the only *bootable* OS-9 applications software you will find is marketed by Tandy. No third party software is directly bootable — you *must* purchase OS-9 from Radio Shack before you can make use of any programs offered anywhere but by Radio Shack.

Once you have booted OS-9, you can go to work with RAINBOW ON DISK. How you go about it will depend on your current system. If you are using OS-9 Level I, enter the following command line at the OS9: prompt:

```
load dir list copy
```

This will load the Dir, List and Copy commands from the CMDS directory of your system disk in Drive 0. After this, when you issue one of these commands, it will execute from memory. This is faster and also allows you to remove the OS-9 system master from the drive. Just don't issue any other OS-9 commands until you have put the system master back in Drive 0. Users of OS-9 Level II will be happy to know the operating system automatically loads these commands into memory when it boots. Now you are ready to insert RAINBOW ON DISK and get under way.

```

073B      linein:=LEFT$(temp,5)+RIGHT$(linein,LEN(linein)-pointer
)
0753      ENDIF
0755      ENDIF
0757      (* are we close to the end of the page? *)
0781      IF linecount>PAGELEN-6 THEN
0791          GOSUB 120
0795      ENDIF
0797
0798      (* If line is too long, do word-wrap *)
07C0      WHILE LEN(linein)>MAXLINE DO
07CE          (* look for last space, and break there *)
07F8          FOR xx:=MAXLINE TO MAXLINE-20 STEP -1
0813              EXITIF MID$(linein,xx,1)=" " THEN
0826                  (* just leave *)
0836              ENDEXIT
083A              NEXT xx
0845
0846          (* adjust pointer *)
085A          xx:=xx-1
0865          (* trim line *)
0874          temp:=RIGHT$(linein,LEN(linein)-xx)
0885          linein:=LEFT$(linein,xx)
0891
0892          (* search for quotation marks, comments, and backslashes *)
08CD          GOSUB 110
08D1
08D2          (* print the line, and adjust it *)
08F5          PRINT #printer,linein
08FF          linecount:=linecount+1
090A          linein:=jump+temp
0916          (* end of too-long line routine *)
0939      ENDWHILE
093D
093E      (* regular-length line, and remainder of too-long line *)
0979      temp:=""
0980      (* search for quotation marks, comments, and backslashes *)
09BB      GOSUB 110
09BF
09C0      (* print the line, and adjust it *)
09E3      PRINT #printer,linein
09ED      IF indent THEN
09F6          jump:=jump+" "
0A03          indent:=FALSE
0A09      ENDIF
0A0E      linecount:=linecount+1
0A16          (* end of file loop *)
0A2C      ENDWHILE
0A30      CLOSE #disk
0A36      (* go to end of page *)
0A4D      PRINT #printer,FF
0A57      (* add extra blank page *)
0A71      PRINT #printer,FF
0A7B      CLOSE #printer
0A81      END
0A83
0A84 110
0A88      (* test for comments, quotes and backslashes *)
0AB7      FOR xx:=1 TO LEN(linein)
0AC9
0ACA          (* check for comments *)
0AE2          yy:=MID$(linein,xx,2)
0AF0          IF yy="( " THEN
0AFE              (* if there is one, look for matching comment *)
0B2E              FOR xx:=xx+1 TO LEN(linein)
0B44                  yy:=MID$(linein,xx,1)
0B52                  EXITIF yy=")" THEN
0B60                      yy:=""
0B67                  ENDEXIT
0B6B                  NEXT xx
0B76              ENDIF
0B78
0B79              yy:=MID$(linein,xx,1)
0B87              (* check for quotation marks *)
0BA6              IF yy=DQ THEN
0BB3                  (* if there is one, look for matching quote *)

```



```

0001      FOR xx:=xx+1 TO LEN(linein)
0002      yy:=MID$(linein,xx,1)
0003      EXITIF yy=DQ THEN
0004      yy=""
0005      ENDEXIT
0006      NEXT xx
0007      ENDF
0008      EXITIF yy="\ " THEN
0009      (* print line to backslash *)
0010      slash:=xx
0011      (* subroutine to print compound lines *)
0012      PRINT #printer,LEFT$(linein,slash-1)
0013      linein:=RIGHT$(linein,LEN(linein)-slash)+temp
0014      jump:=jump+" "
0015      linecount:=linecount+1
0016      indent:=FALSE
0017      GOTO 100
0018      ENDEXIT
0019      NEXT xx
0020      RETURN
0021  120
0022      (* print header *)
0023      IF init THEN
0024      pagecount:=1
0025      ELSE
0026      FOR xx:=1 TO 5
0027      PRINT #printer
0028      NEXT xx
0029      ENDF
0030      PRINT #printer,dayt;
0031      PRINT #printer,DOUBLE;
0032      PRINT #printer,TAB((50-LEN(filename))/2); filename;
0033      PRINT #printer,SINGLE;
0034      PRINT #printer,TAB(50); "Page no: "; pagecount
0035      PRINT #printer
0036      linecount:=2
0037      pagecount:=pagecount+1
0038      RETURN
0039  130
0040      (* error- handling routine *)
0041      errno:=ERR
0042      PRINT
0043      IF errno=215 OR errno=216 THEN
0044      PRINT "File "; filename; " not found!"
0045      ELSE
0046      IF errno=56 THEN
0047      PRINT
0048      PRINT "Usage: pr ("; DQ; "filepath"; DQ; ") "
0049      PRINT
0050      END
0051      ENDF
0052      PRINT "Error #"; errno
0053      ENDF
0054      END
0055  PROCEDURE date
0056      (* set up to print as month-day-year *)
0057      PARAM dayt:STRING[12]
0058      DIM month:INTEGER
0059      DIM mo(12):STRING[3]
0060      DIM xx,yy:INTEGER
0061      month:=VAL(MID$(DATE$,4,2))
0062      FOR xx:=1 TO 12
0063      READ mo(xx)
0064      NEXT xx
0065      dayt:=mo(month)+". "+MID$(DATE$,7,2)+". 19"+LEFT$(DATE$,2)
0066      DATA "Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep",
0067      "Oct","Nov","Dec"
0068      END

```

If you are using a single floppy-drive system, replace the system master in Drive 0 with RAINBOW ON DISK and enter `chd /d0`. If you have two floppy drives, leave the system master in Drive 0, place RAINBOW ON DISK in Drive 1 and enter `chd /d1`. In either case, the `chd` command tells OS-9 what disk and directory you want to work with. It selects your *current data directory*. Until you use `chd` to select a different working directory, OS-9 will assume you want the commands you enter to act on the files in the selected directory.

Now, to see what is in the *root* directory of RAINBOW ON DISK, just type `dir` and press ENTER. You will see one file named `read.me.first`. You will also see at least one file listed whose name is in all upper-case letters. This is *not* a file. The accepted standard used with OS-9 dictates that we use all uppercase letters to indicate a "file" is really a subdirectory. So, you will see `CMDS` and/or `SOURCE` listed as subdirectories on the disk. To get to the `CMDS` directory, enter `chd cmds`. This selects the `CMDS` directory as your working directory. Enter `chd ..` to get back to the root directory. You can now enter `dir` to see what is in that directory. You can also use `copy` to copy the files to your system disk if you want. The `CMDS` directory is used to hold compiled C or assembled ML programs. If no assembly or C programs are published in a given month, you won't find this directory on the disk.

On the other hand, the `SOURCE` directory contains any ML, C or BASIC09 source code, as well as any procedure files published that month. We don't put packed BASIC09 files on RAINBOW ON DISK. It is expected that you will load the source and pack it, if you want, following the instructions in the BASIC09 manual.

To get to the `SOURCE` directory from the root, type `chd source` and press ENTER. If you have selected `CMDS` as your current directory as above, you can get to `SOURCE` by typing `chd ../source` and pressing ENTER. Once there, you can use `dir` to see the contents of this subdirectory. You can also use `list` to see the actual source code files or `copy` to copy the files to another disk.

As a final word, before you can use any of the programs on RAINBOW ON DISK, you will have to know what they do and how to use them. You can gain this information by reading the articles in the magazine.

—Cray Augsburg



Barden's Buffer

Years ago, the question would have baffled puzzle freaks — for CoCo users, the solution takes about a minute.

Perplexing Puzzles

By William Barden, Jr.
Rainbow Contributing Editor

I'm a puzzle freak, but I've never had a flair for solving puzzles quickly. I'd rather find the answer to a puzzle with brute force on a computer. It's amazing what can be done on the CoCo to solve puzzles. In this column I'll provide some old and new ones, all of which can be solved on the CoCo by clever or not-so-clever programming. I'll give you the answers, but I'll also give you four puzzles without answers, which I'll provide in a later column.

Puzzle 1: Programs in Memory

A CoCo buff named Rupert has three free slots in his Multi-Pak Interface. He has seven game cartridges, labeled A, B, C, D, E, F and G. In how many different combinations can Rupert arrange three game cartridges from the seven? One way is to insert cartridges A, B and C. Another is to insert cartridges A, B and G. Order is not important (it doesn't matter which slots the three cartridges fit in).

Solution

This problem is known as a "combination of n things taken k at a time". To make the explanation easier, suppose we have five cartridges labeled A, B, C, D and E, and three empty slots. We could use these combinations:

ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE and CDE

A way to list all the combinations is to start at the left of the list of all things: A, B, C, D, E; and pick the first three: ABC. Now substitute a new item for the last item, working towards the right: ABD, ABE. The AB sequence is now exhausted, so move to the right and work with AC — ACD and ACE. The AC sequence is now exhausted, so move to the right and work with AD — ADE. All three item sequences starting with A, have been exhausted, so move to the right and work with BC — BCD, BCE and then BD — BDE. Finally, work with CD — CDE, and so on.

This process can be implemented in a program as shown in Listing 1. It finds all combinations of seven things taken three at a time — the three slots of the Multi-Pak filled with seven cartridges. Variable P represents the index 1 to 7 of the far left item of the three. Variable Q, the index of the middle item, and Variable

R, the index of the far right item. The three variables index into array A\$, which is filled with A, B, C, D, E, F and G. The three variables are changed just as they are manually, moving from left to right. The print lists all possible combinations — 35 in all:

ABC	ACE	AEF	BCG	BFG	CFG
ABD	ACF	AEG	BDE	CDE	DEF
ABE	ACG	AFG	BDF	CDF	DEG
ABF	ADE	BCD	BDG	CDG	DFG
ABG	ADF	BCE	BEF	CEF	EFG
ACD	ADG	BCF	BEG	CEG	

Puzzle 2: Buying Disks

Diskettes at one Radio Shack store in Pudd, Wyoming are sold 16, 17, 23, 24, 39 and 40 to a package. A customer wants exactly 100 disks, no more, no less. Assuming that packages cannot be broken, are there any combinations of packages that will make up exactly 100 disks, or will the customer have to travel to the Pudd Computerland store for his purchase? (Adapted from an old Henry E. Dudeney puzzle.)

Solution

You could work this out manually, but I just hate to waste scratch paper when there's a perfectly good CoCo ready to crunch through hours of comparisons. . . Here's a little preprocessing to make the problem palatable: There cannot be any more than six 16-disk packages — that's 96 disks. Similarly, there cannot be more than five 17-disk packages, 85 disks, four 23-disk packages, four 24-disk packages, two 39-disk packages, or two 40-disk packages. Therefore, 100 disks will have to be made up from these 23 packages:

16, 16, 16, 16, 16, 16, 17, 17, 17, 17, 17, 23, 23, 23, 23, 24, 24, 24, 24, 39, 39, 40, 40

There cannot be more than six packages (seven packages of 16 disks is 112 disks). Also, there has to be more than two packages (two 40-disk packages is 80 disks). There are three to six packages to make up 100 disks, if this is even possible.

A computer solution to this is shown in Listing 2. It's similar to the first problem — 23 things taken three to six at a time. For each combination, a check is made to see if the combination equals exactly 100 items. If so, the answer is printed. There will be some redundancy as the program works through packages that hold the same number of items. Listing 2 shows the combinations of six

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

items. The variables and total computation can easily be changed for three, four and five items. However, when the program is run for six items from a possible 23, a result is found:

16+, 16+, 17+, 17+, 17+, 17+ = 100 disks

This technique can be found for other similar problems. In Computer Science classes, the classic problem is a "Knapsack" problem: Given a knapsack that can hold 60 pounds, what is the optimum packing of various items weighing different amounts and with varying degrees of value?

Puzzle 3: Palindromic Square Numbers

A *palindrome* is a number or word which reads the same forwards or backwards (the most famous palindromic sentence is "A man, a plan, a canal — Panama!"). An example of a palindromic number is 12344321. How many squares of 1 to 1000 are palindromic? A square of 1 is 1, of 2 is 4, of 3 is 9, of 4 is 16, of 25 is 625, and so forth.

Solution

It would have baffled puzzle freaks years ago. On the CoCo, however, it takes only about a minute. The program is shown in Listing 3. The trick is to convert the numeric form of the number to a string so the digits can be compared. This is done easily by the STR\$ function. However, this function uses a leading sign, a blank when the number is positive, as all squares are. The RIGHT\$ function lops off the leading blank.

The program uses two variables — L, which points to the leftmost digit of the string, and R, which points to the far right digit of the string. If the leftmost and far right digits are the same and the R and L pointers cross, the square is palindromic and is printed. The results are:

1	1
2	4
3	9
11	121
22	484
26	676
101	10201
111	12321
121	14641
202	40804
212	44944
264	69696
307	94249
836	698896

It's interesting to note that only the last square has an even number of digits and that 10 of the numbers are also palindromic.

There are fewer cubes that are palindromic, but all cube roots of palindromic cubes to 1000 are palindromic. Modify the program to $J=I*I*I$ to find them.

Puzzle 4: Interest Compounding

I recently received a pleasant surprise. One of my forefathers had invested one month's salary in 1688 — a total of \$1 — at the then phenomenal rate of 8 percent interest per year in First Pilgrim Savings and Loan in Massachusetts. He evidently forgot about it and it wasn't until recently that First Pilgrim was able to track down the only surviving relative — me. The account called for the interest to be compounded at the end of each year, that is, added to the principal amount. At the end of the first year, the \$1 had risen

VIP Writer 1.1

RATED "BEST" IN SEPT '88 "RAINBOW"

VIP Writer has all the features of VIP Writer III described elsewhere in this magazine except the screen widths are 32, 51, 64 & 85. Screen colors are black, green & white, double clock speed is not supported. Spooler and menus are unavailable because of memory limitations. Even so, VIP Writer is the BEST word processor for the CoCo 1 & 2! Version 1.1 includes the configuration program and RGB Hard Disk support. Includes VIP Speller 1.1. DISK \$69.95

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to \$1.08, at the end of the second year, the \$1.08 had risen to \$1.08 * 1.08 = \$1.16, and so on. How much did I collect — \$2037, \$50766, \$127,536 or \$10, 644, 533, 790?

Solution

Incredibly, I collected \$10,644,533,790! (However, taxes were \$10,644,533,780.) Listing 4 shows the computations. A single dollar invested for nine years at 8 percent interest, with interest compounded (added to the principal) once per year is worth $1.08 * 1.08 * 1.08 * 1.08 * 1.08 * 1.08 * 1.08 * 1.08 = \1.99900463 , about twice the original principal.

As an approximate rule of thumb: If you take the interest rate and divide it into 72, you'll find the number of years it takes for the principal to double. For example, an account with 12 percent interest will double in $72/12=6$ years. The \$1 in the First Pilgrim account doubles in 9 years to \$2. At the end of 18 years, it's worth \$4. At the end of 27 years it's worth \$8. At the end of 36 years, \$16. At the end of 45 years, \$32; 54 years, \$64; 63 years, \$128; 72 years, \$256; 81 years, \$512; 90 years, \$1024; 99 years, \$2048; 108 years, \$4096; 117 years, \$8192; 126 years, \$16,384; and so forth.

Listing 4 also handles compounding at intervals of greater than one year. If interest is compounded quarterly, that \$10,644,533,790 turns out to be worth \$20,902,886,000! The difference is that interest on interest earns more money. If the interest is compounded monthly, the accumulated amount is \$24,461,233,600. If the interest is compounded daily, as in many accounts, the accumulated amount is \$26,419,329,300. If you think that compounding has diminishing returns, you're right. Suppose the money was compounded every second? Or every 1/10 second? The growth reaches a limiting amount — about \$26,800,000,000. CoCo BASIC, with its high precision, is ideally suited for such interest computations, and is at least as accurate as mainframe computers.

Puzzle 5: A Cryptarithm

A cryptarithm is a puzzle in which letters are substituted for digits in an arithmetic problem. The answer is usually solved by logical reasoning. For example, the cryptarithm:

$$\begin{array}{r} \text{SEAM} \\ \times \text{T} \\ \hline \text{MEATS} \end{array}$$

can be worked out to be:

$$\begin{array}{r} 4973 \\ \times 8 \\ \hline 39784 \end{array}$$

A different type of cryptarithm (attributed to Joseph Ellis Trevor) is:

$$\begin{array}{r} \text{PPP} \\ \times \text{PP} \\ \hline \text{PPPP} \\ \text{PPPP} \\ \hline \text{PPPPP} \end{array}$$

where each P is a prime digit of 2, 3, 5 or 7. For example, the result could be 53572. What is the correct answer?

Solution

The key to this puzzle is in the possible permutations that the multiplicand (the number on the top) and the multiplier (the number on the second line) can take. Unlike the combinations of

Puzzles 1 and 2, permutations are order dependent. Let's consider the multiplicand first. There are four possible digits per position and four digit positions. Starting from the lowest number, it's easy to count up:

2222
2223
2225
2227
2232
2233
2235
2237
2252
2253
2255
2257
2272
etc.

Just count as you would in counting decimal numbers, moving to the next higher digit position when necessary. The last numbers in this sequence are:

7772
7773
7775
7777

As there are four digits — 2, 3, 5 and 7 — the total number of permutations is 4 to the fourth, or 256. The multiplier has two digits and can be 22, 23, 25, 27, 32, 33, 35, 37, 52, 53, 55, 57, 72, 73, 75 and 77 — 16 permutations in all.

This means there are 256 times 16 = 4096 permutations that can be checked for validity in a computer program. Each of the two partial results and the final result can be checked to make certain they contain only the digits 2, 3, 5 or 7. Listing 5 shows the program.

The variables in this program are arranged as follows:

A3	A2	A1		
B2	B1			
C4	C3	C2	C1	
D5	D4	D3	D2	
R5	R4	R3	R2	R1

The multiplicand starts at 222 and the multiplier at 22. For each pass through the program the multiplier is incremented — 22 becomes 23, which becomes 25, which becomes 27, which becomes 32, and so forth up to 77. At 77, the multiplier is reset to 22 and the lowest digit of the multiplicand is incremented. 4096 permutations are processed, from 222/22 through 777/77. For each permutation, the digits of the multiplicand, multiplier, partial results, and result are checked to see if all are 2, 3, 5 or 7. If so, the answer is displayed and the program continues. If not, the program continues. The five lines of digits are also kept as single numbers for ease of computation — variables A, B, C, D and R. The single answer is displayed as:

$$\begin{array}{r} 7 \quad 7 \quad 5 \\ \times 3 \quad 3 \\ \hline 2 \quad 3 \quad 2 \quad 5 \\ 2 \quad 3 \quad 2 \quad 5 \\ \hline 2 \quad 5 \quad 5 \quad 7 \quad 5 \end{array}$$

Bartten's Buffer Domicile.

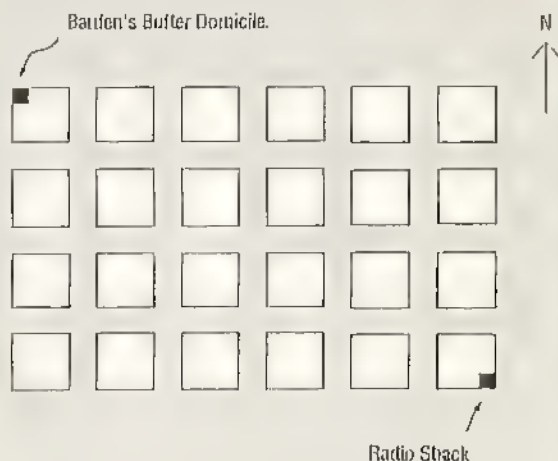


Figure 1

uses as the "seed" for the random number generator is 3792. Why is this not a good idea?

Solution

One has to be very careful in generating random numbers. Most schemes produce numbers that are not truly random at all. It's not sufficient to say — "Well, I'll start with a number, multiply by 27,128, add 10,000, and then divide by 34." In the scheme of this puzzle, starting with 3792 produces $3792 \times 3792 = 14,379,264$. Taking the middle four digits of the result produces 3792 again. The random number sequence is, therefore, 3792, 3792, 3792, etc. The program that illustrates this is in Listing 6A.

A better random number generator multiplies some seed number by a prime, adds a prime, and then truncates the result, as shown in Listing 6B.

A sequence produced by this code is:

20680
31642
42604
53566
64528
9954
20916

Puzzle 6: Random Number Generator

A CoCo scientist wants to generate a series of random numbers. She decides that a good way to do it is to square a four-digit number and take the four middle digits as the new number, square the new number, take the four middle digits, and so forth. The number she

Notice anything unusual about it? Right — there are even numbers only. We'll leave it up to the reader as an exercise to come up with a good random number generator. A good random number generator should have an even distribution of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9, and should not repeat more often than a few billion numbers or so. The code in BASIC is from \$BF3B. . .

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Puzzle 7: Getting to Radio Shack

The nearest Radio Shack store to me is located about 10 blocks away, as shown in Figure 1. I'm diagonally opposite the Radio Shack store. I usually walk four blocks south and then six blocks east to get to it. Just for fun, though, I've been varying the route. Yesterday I walked two blocks east, two blocks south, three blocks east, two blocks south, and then one block east to get to the store. Today, I'll try a different route. Assuming that I don't walk any extra blocks, in how many different ways can I get to those Archer soldering irons?

Solution

Obviously, I will never have to walk more than 10 blocks, and I'll have to walk a total of six blocks east and a total of four blocks south regardless of the route. If I let 1 represent one block east and 0 represent one block south, then all possible routes are found in the sequence:

```
0000000000
0000000001
0000000010
0000000011
0000000100
```

.

.

```
1111111111
```

Each number in this sequence is made up of 10 ones or zeroes (for the ten blocks). There are 1024 numbers in the sequence, 0000000000 to 1111111111. However, most numbers are not valid. Only those numbers that have six ones (six blocks east) and four zeroes (four blocks south), define a valid route. Figure 2 shows an example.

To find the valid routes, therefore, just count in binary from 0000000000 through 1111111111 and check each number for six ones. Each number with six ones defines a valid route. As it turns out, there is a formula to express this — it defines the number of permutations (order dependent) arrangements of routes given a fixed number of things. In this case there must be six east increments and four south increments, so the formula is:

$$= \frac{10!}{6! 4!} = \frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \text{ permutations}}{1 \times 2 \times 3 \times 4 \times 5 \times 6 \quad 1 \times 2 \times 3 \times 4} = \frac{7 \times 8 \times 9 \times 10}{1 \times 2 \times 3 \times 4} = 7 \times 3 \times 10 = 210$$

The program shown in Listing 7 counts in binary from 0000000000 through 1111111111. For each value, a check is made of the number of ones. If it is six, a count is incremented and an asterisk is placed before the line listing the value. Then the route is drawn on the graphics screen. At the end of the program all 210 routes have been listed and drawn.

Puzzle 8: Compressing Data

"I have a message I want to send via the DelCompuGenic communications network, but they charge \$.10 per bit. There are

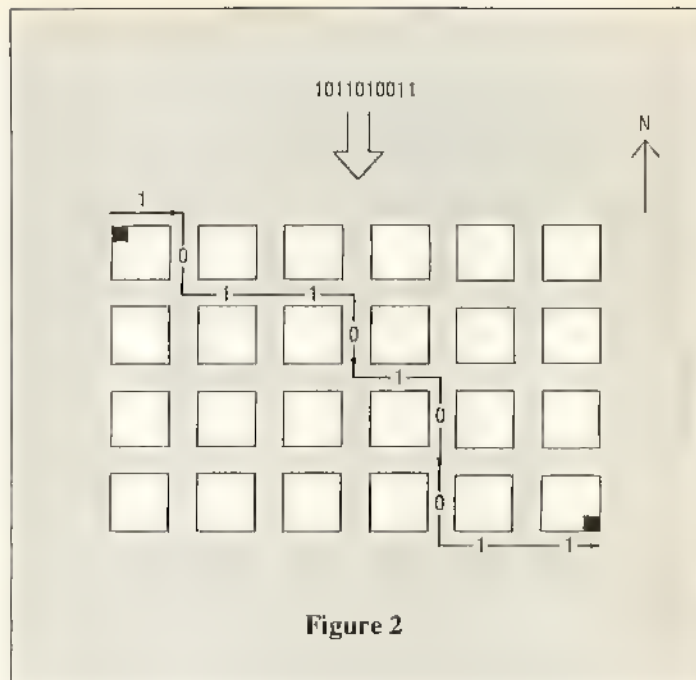


Figure 2

28 characters in this message, 224 bits. That's \$22.40 and too much to pay," moaned Murray, the CoCo hacker. "Don't worry — I can cut your costs in half. But the person on the other end must know the code," said the CoCo Guru. How did he do it and what was the code? The message was:

"MARY.MERRY CHRISTMAS.MURRAY."

and the normal ASCII coding is:

```
01001101 01000001 01010010 01011001 00101110 01001101
01000101 01010010 01010010 01011001 00100000 01000011
01001000 01010010 01001001 01010011 01010100 01001101
01000001 01010011 00101110 01001101 01010101 01010010
01010010 01000001 01011001 00101110 = 224 bits
```

Solution

There are various data compression schemes, but one of the most popular is known as Huffman Coding. It represents the most frequently occurring characters with the fewest bits, usually starting at one or two bits. Less frequent characters may have even more than the eight bits ASCII uses, but the average character length is generally less than eight bits, often half that.

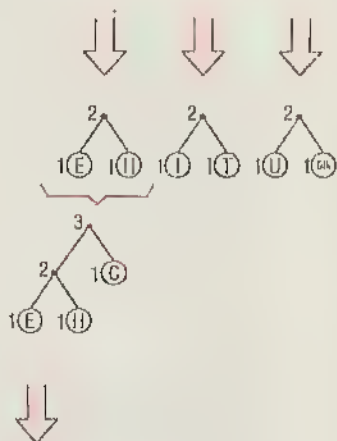
There's a purely mechanical way to get a Huffman Code. Arrange the characters used in order of use in a list. In the message above, this arrangement is:

6-R 4-M 3-A 3-Y 3-. 2-S 1-C 1-E 1-H 1-I 1-T 1-U 1-blk

Now form a "tree" node taking the two least frequent characters, as shown in Figure 3. Put this tree node in order in the list and use the next least frequent character to form a new node. Continue in this fashion until you have an entire tree. Now label left branches of the tree zero and right branches one. Reading down the tree will give the code for each character. 10001 is the code for H, for example. Now code each character of the message with its code. Notice there are no breaks for the characters. The program in Listing 8 reads the code, providing it knows the code beforehand. In a long message, this code can be sent first, before the actual encrypted message. The Huffman-encoded message here is 96 bits, only 43 percent of the 224 bits used in normal ASCII. We've used a string to hold the bits here, but in actuality, the 96 bits would

Decreasing Occurrence →

6(R) 4(M) 3(A) 3(Y) 3(C) 2(S) 1(G) 1(E) 1(U) 1(I) 1(T) 1(O) 1(H)



Final Tree

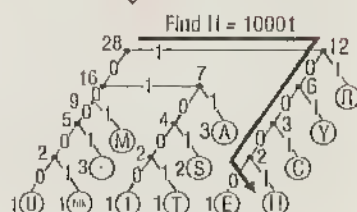


Figure 3

be held in 12 bytes.

The scheme for Huffman encoding can be used for a message of any type and any length.

Reader's Challenge

Here are four puzzles similar to the ones above. Try your hand at them and send your answers to me at the following address:

P.O. Box 3568, Mission Viejo, CA 92692

Best answers for each question will be given special mention in this column, and a genuine machine-embossed certificate of CoCo puzzle-solving prowess.

Challenge Number One

A pair of dice has six faces per die with 1, 2, 3, 4, 5 and 6 dots per face. Can you provide a program that will list all of the ways to roll a 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 and give the odds for each number?

Challenge Number Two

Can you find a CoCo-related cryptarithm to fit this form?

$$\begin{array}{r} X \ X \ X \ X \\ + \ X \ X \ X \ X \\ \hline X \ X \ X \ X \end{array}$$

Or any form?

Challenge Number Three

In Puzzle 8, 224 bits were reduced to 96. Suppose there is a list

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of 4096 common words (such as *cat*, *and*, *house*) that can be sent. The words are known to the sender and receiver. Can you describe a scheme that will enable a CoCo user to compress a message even more than 43 percent?

Challenge Number Four

Are there any numbers that equal the sum of the cubes of their digits? For example, the cubes of the digits of 126 are 1, 8 and 216. The sum of the cubes of the digits is $1 + 8 + 216 = 225$.

See you next month with more CoCo topics. □

Listing 1: PUZZLE1

```
100 ' PRINT 7 THINGS TAKEN 3 AT
A TIME
110 N=7:K=3:CT=0
120 DIM A$(N)
130 A$(1)="A":A$(2)="B":A$(3)="C"
":A$(4)="D":A$(5)="E":A$(6)="F":
A$(7)="G"
140 FOR P=1 TO N-K+1
150 FOR Q=P+1 TO N-K+2
160 FOR R=Q+1 TO N-K+3
170 PRINT A$(P);A$(Q);A$(R)
180 CT=CT+1
190 NEXT: NEXT: NEXT
200 PRINT CT
```

Listing 2: PUZZLE2

```
100 ' BUYING DISKETTES
110 N=23:K=6
120 DIM A(N)
130 A(1)=16:A(2)=16:A(3)=16:A(4)
=16:A(5)=16:A(6)=16
140 A(7)=17:A(8)=17:A(9)=17:A(10)
=17:A(11)=17
150 A(12)=23:A(13)=23:A(14)=23:A
(15)=23
160 A(16)=24:A(17)=24:A(18)=24:A
(19)=24
170 A(20)=39:A(21)=39
180 A(22)=40:A(23)=40
190 FOR P=1 TO N-K+1
200 FOR Q=P+1 TO N-K+2
210 FOR R=Q+1 TO N-K+3
220 FOR S=R+1 TO N-K+4
230 FOR T=S+1 TO N-K+5
240 FOR U=T+1 TO N-K+6
250 IF A(P)+A(Q)+A(R)+A(S)+A(T)+
A(U)=100 THEN PRINT: PRINT A(P);
A(Q);A(R);A(S);A(T);A(U)
260 PRINT " ";
270 NEXT: NEXT: NEXT: NEXT: NEXT: NEX
T
```

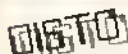


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Listing 3: PUZZLE3

```

100 ' PALINDROMIC SQUARE NUMBERS
110 FOR I=1 TO 1000
120 J=I*I
130 A$=RIGHT$(STR$(J), LEN(STR$(J)) - 1)
140 L=1: R=LEN(A$)
150 IF MID$(A$, L, 1) <> MID$(A$, R, 1) THEN GOTO 180
160 L=L+1: R=R-1: IF R<L THEN PR
INT I, A$: GOTO 180
170 GOTO 150
180 NEXT

```

Listing 4: PUZZLE4

```

100 ' INTEREST COMPUTATION
110 INPUT "PRINCIPAL:"; P
120 INPUT "% PER YEAR:"; R
130 R=R/100
140 INPUT "# OF COMPOUNDING PERI
ODS PER YEAR:"; N
150 INPUT "# OF YEARS:"; Y
160 PRINT P*(1+R/N)^(Y*N)
170 GOTO 110

```

Listing 5: PUZZLE5

```

100 ' 2-3-5-7 CRYPTARITHM
110 A3=2: A2=2: A1=2: B2=2: B1=2
120 A=A3*100+A2*10+A1
130 B=B2*10+B1
140 C=B1*A
150 D=B2*A
160 R=A*B
180 C4=INT(C/1000): C=C-C4*1000
190 C3=INT(C/100): C=C-C3*100
200 C2=INT(C/10): C=C-C2*10
210 C1=C
220 D5=INT(D/1000): D=D-D5*1000
230 D4=INT(D/100): D=D-D4*100
240 D3=INT(D/10): D=D-D3*10
250 D2=D
260 R5=INT(R/10000): R=R-R5*10000
270 R4=INT(R/1000): R=R-R4*1000
280 R3=INT(R/100): R=R-R3*100
290 R2=INT(R/10): R=R-R2*10
300 R1=R
310 IF C4<>2 AND C4<>3 AND C4<>5
AND C4<>7 GOTO 500
320 IF C3<>2 AND C3<>3 AND C3<>5
AND C3<>7 GOTO 500
330 IF C2<>2 AND C2<>3 AND C2<>5
AND C2<>7 GOTO 500
340 IF C1<>2 AND C1<>3 AND C1<>5
AND C1<>7 GOTO 500
350 IF D5<>2 AND D5<>3 AND D5<>5

```

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```

AND D5<>7 GOTO 500
360 IF D4<>2 AND D4<>3 AND D4<>5
AND D4<>7 GOTO 500
370 IF D3<>2 AND D3<>3 AND D3<>5
AND D3<>7 GOTO 500
380 IF D2<>2 AND D2<>3 AND D2<>5
AND D2<>7 GOTO 500
390 IF R5<>2 AND R5<>3 AND R5<>5
AND R5<>7 GOTO 500
400 IF R4<>2 AND R4<>3 AND R4<>5
AND R4<>7 GOTO 500
405 IF R3<>2 AND R3<>3 AND R3<>5
AND R3<>7 GOTO 400
410 IF R2<2 AND R2<>3 AND R2<>5
AND R2<>7 GOTO 500
420 IF R1<>2 AND R1<>3 AND R1<>5
AND R1<>7 GOTO 500
425 PRINT
430 PRINT " ";A3;A2;A1
440 PRINT " "; B2; B1
450 PRINT " -----"
460 PRINT " ";C4;C3;C2;C1
470 PRINT D5;D4;D3;D2
480 PRINT " -----"
490 PRINT R5;R4;R3;R2;R1
500 IF B1=2 THEN B1=3 ELSE IF B1
=3 THEN B1=5 ELSE IF B1=5 THEN B
1=7 ELSE B1=2: IF B2=2 THEN B2=3
ELSE IF B2=3 THEN B2=5 ELSE IF
B2=5 THEN B2=7 ELSE B2=2
510 IF B2<>2 OR B1<>2 THEN GOTO
530
520 IF A1=2 THEN A1=3 ELSE IF A1
=3 THEN A1=5 ELSE IF A1=5 THEN A
1=7 ELSE A1=2: IF A2=2 THEN A2=3
ELSE IF A2=3 THEN A2=5 ELSE IF
A2=5 THEN A2=7 ELSE A2=2: IF A3=
2 THEN A3=3 ELSE IF A3=3 THEN A3
=5 ELSE IF A3=5 THEN A3=7 ELSE A
3=2
530 IF A3=2 AND A2=2 AND A1=2 AN
D B2=2 AND B1=2 THEN STOP ELSE P
RINT ".": GOTO 120

```

Listing 6A: PUZZLE6A

```

100 ' PSEUDO-RANDOM NUMBERS
110 N=3792
120 M=N*N
130 A$=MID$(STR$(M),4,4)
140 PRINT A$
150 N=VAL(A$)
160 GOTO 120

```

Listing 6B: PUZZLE6B

```

100 ' BETTER PSEUDO-RANDOM NUMBE
RS
110 S=123456
120 S=S+64153

```



```

121 S=S+12345
130 S=S-INT(S/65536)*65536
140 PRINT S
150 GOTO 120

```

Listing 7: PUZZLE7

```

100 ' BLOCK GRIDS
110 P=0
120 I0=0: I1=0: I2=0: I3=0: I4=0
: I5=0: I6=0: I7=0: I8=0: I9=0
130 I0=I0+1: IF I0=2 THEN I0=0: I1
=I1+1: IF I1=2 THEN I1=0: I2=I2+1:
IF I2=2 THEN I2=0: I3=I3+1: IF I3=
2 THEN I3=0: I4=I4+1: IF I4=2 THEN
I4=0: I5=I5+1
140 IF I5=2 THEN I5=0: I6=I6+1: IF
I6=2 THEN I6=0: I7=I7+1: IF I7=2
THEN I7=0: I8=I8+1: IF I8=2 THEN I
8=0: I9=I9+1: IF I9=2 THEN GOTO 35
0
150 CT=I9+I8+I7+I6+I5+I4+I3+I2+I
1+I0
160 IF CT=6 THEN P=P+1: PRINT "*"
" ELSE GOTO 330
170 PMODE 3,1
180 SCREEN 1,0
190 PCLS
200 DRAW "BM119,90"
210 IF I9=1 THEN DRAW "R3" ELSE
DRAW "D3"
220 IF I8=1 THEN DRAW "R3" ELSE
DRAW "D3"
230 IF I7=1 THEN DRAW "R3" ELSE
DRAW "D3"
240 IF I6=1 THEN DRAW "R3" ELSE
DRAW "D3"
250 IF I5=1 THEN DRAW "R3" ELSE
DRAW "D3"
260 IF I4=1 THEN DRAW "R3" ELSE
DRAW "D3"
270 IF I3=1 THEN DRAW "R3" ELSE
DRAW "D3"
280 IF I2=1 THEN DRAW "R3" ELSE
DRAW "D3"
290 IF I1=1 THEN DRAW "R3" ELSE
DRAW "D3"
300 IF I0=1 THEN DRAW "R3" ELSE
DRAW "D3"
310 FOR I=0 TO 500: NEXT
320 SCREEN 0,0
330 PRINT I9;I8;I7;I6;I5;I4;I3;I
2;I1;I0
340 GOTO 130
350 PRINT P; "PERMUTATIONS"

```

Listing 8: PUZZLE8

```

100 ' HUFFMAN CODING

```

```

110 DIM A$(13)
120 A$(1)="11"
130 A$(2)="001"
140 A$(3)="011"
150 A$(4)="101"
160 A$(5)="0001"
170 A$(6)="0101"
180 A$(7)="1001"
190 A$(8)="10000"
200 A$(9)="10001"
210 A$(10)="01000"
220 A$(11)="01001"
230 A$(12)="00000"
240 A$(13)="00001"
250 B$="RMAY.SCEHITU "
260 C$="001011111010001001100001
111101000011001100001110100001010
100100101101010000100100000111101
110100001"
270 I=1
280 FOR J=1 TO 13
290 IF MID$( C$, I, LEN( A$( J )
) ) = A$( J ) THEN GOTO 320
300 NEXT
310 STOP
320 PRINT MID$( B$, J, 1 );
330 I = I + LEN( A$( J ) )
340 GOTO 280

```



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Building Two Handy Tools

By Dale L. Puckett
Rainbow Contributing Editor

Many times during the past year I've wished for a utility to find a file buried somewhere 10 levels deep in the bowels of an OS-9 directory tree. Since that utility has never surfaced, I decided it would make a good project and an excellent subject for a BASIC99 programming tutorial. Because of the nature of the problem and the path traveled to find the solution, I'm presenting two handy utilities this month — *DiskDir* and *Find*. We'll make an intermediate stop at *Find It* and consider several diversions along the way. Even though this month's code looks simple, the process used to get there is not.

First, Heed This Advice!

Back up those hard disks before something happens!

You may have noticed that "KISSable OS-9" didn't appear last month. I was too busy finding out that if you tempt fate long enough, it'll find your number. In February, my 20-megabyte hard disk was wiped out by a runaway program. It may have been a virus or worm carried in a program someone sent my way, or it may have been because I was half asleep after a long day at the salt mine and wasn't paying close enough attention. I'll never know the answer, because I'm not going to run the

suspect program again. In fact, I won't plug that disk into any of my drives unless it's to format it.

I must have read a hundred articles urging me to back up my hard disks during the past year. Unfortunately, I didn't heed the warnings. As a result, I spent all my spare time for two or three weeks attempting to restore lost data. Believe me, it takes a long time to restore a hard disk when the data it contained is spread across 150 unorganized floppy disks. Even more time and money is consumed when you have to return to your favorite online service and download many of the files a second time. So back it up, now!

One good thing did come out of the rebirth of my hard disk, however. I paid a lot more attention to my organization, right from the start. For example, I now have only 12 files — nine are directories at the root level.

And I paid attention to the all-important, though not highly advertised, IT.SAS byte in the hard-disk descriptor. When I first received the hard-disk drive, I must have been going through another of those careless periods. Frank Hogg sent me a device descriptor for the new hard drive with the IT.SAS byte set at 1. Not paying attention, I loaded hundreds of files before I noticed the mistake. Before long, access to the files on the hard disk slowed down to the sleepy pace of an original Radio Shack 35-track floppy disk running with an unmodified 30-millisecond stepping rate — well, maybe not quite that slow.

After discovering the error, I used one of the public-domain *Dnode* utilities to change the IT.SAS byte to \$20. Then I cobbled a new OS-9 boot file, and access to files created after the change came like

greased lightning. After the crash, I installed a device descriptor with the proper IT.SAS value right from the start. The system flies!

Finding That Lost File

Soon after driving a hard disk with an operating system equipped with a hierarchical file system like OS-9, you'll be thrilled with the power and organizational capability. Later, when you've forgotten the ingenious idea behind the organization of your files, you see the liability of a hierarchical file system: "Let's see, did I store the recipe for fried eggs in the FOOD directory or did I store it in BREAKFAST?"

If you use a more powerful computer at work, it's easy to become spoiled. For example, when I can't remember where I stored a file on the Macintosh desktop publishing system at work, I go to the Apple menu and run a desk accessory named *Find File*, then give it the name. A few seconds later, it gives me the location of the file.

After manually searching for hundreds of files during the past several months, it was obvious that because of the proliferation of hard disk drives, a find file for Color Computer OS-9 is desperately needed.

There are two stand-alone utilities you can run from the OS-9 command line. Eventually, this core code may be incorporated into a menu-driven application run from *Multi-View*. The listing names for this month are: *DiskDir*, *Dodir*, *Findit*, *Find* and *Checkdir*.

The algorithm that makes it work can be studied in the listings *Checkdir* and *Dodir*. The other three listings contain code that drives *Checkdir* or *Dodir*.

You will need to Pack the five proce-

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dures to your CMDS directory before execution. Some execution examples follow:

```
diskdir <ENTER>
diskdir /dd/com <ENTER>
```

If you exercise the first option above, *Diskdir* immediately begins to print a hierarchical listing of the directory of the default drive, /dd, to the Color Computer screen. If you have need for a hard copy, type: diskdir >/p, then press ENTER.

If you chose the optional command line, you can start your listing at a specified directory. For example, the command line above produces this listing:

```
PRO
  genie
  cis24
  delphi
  prostuff
  mac
SIGS
  CISmail
  abc
  GENIEmail
  def
  DELPHIEmail
  ghi
  kjl
  MACmail
  mno
  max9.ar
```

The utility *Findit* is an earlier version of *Find* that works like most programs coded with a BASIC interpreter. It prompts you for the information it needs. For example:

```
OS9: findit <ENTER>
Type a few characters from the name of
the file you need: max
Type the path to the directory you
would like to start in: /dd/com
max9.ar is in /DD/COM/SIGS/MACmail.
```

OS-9 users, on the other hand, want most of their programs to run in a unified

manner. In general, they want to supply any needed parameters to a program on the command line. And they want to be able to redirect the output of the program to a file or any number of devices. The utility *Find* does this for you. Here are a few samples of *Find*'s command-line syntax:

```
find max /dd/com <ENTER>
max9.ar is in /DD/COM/SIGS/MACmail

find max <ENTER>
Type the path to the directory you
would like to start in: /dd/com/sigs
max9.ar is in /DD/COM/SIGS/MACmail

find <ENTER>
Type a few characters from the name of
the file you need: max
Type the path to the directory you
would like to start in: <ENTER>
icon.max is in /DD/CMDS/ICONS
max9 is in /DD/CMDS
max9.ar is in /DD/COM/SIGS/MACmail
maxdemo.vcf is in /DD/DOCUMENTS
AIF.max is in /DD/TOOLS
```

Since we pressed the ENTER key in response to *Find*'s second question, it automatically started its search for the string max in the root directory of the default drive /dd. It found five files containing the string among the hundreds of files stored on the hard disk.

How They Work

Because of the process used to solve the *Find File* problem, these utilities will not break any speed records. For example, on a 20-megabyte hard disk containing 697 files, spread throughout 42 directories, in 13380 sectors, *Find* took approximately three minutes to locate four filenames. By comparison, the longest *Find File* search I've ever seen on a Macintosh II is 40 to 45 seconds.

On the up side, the Color Computer running OS-9 is a multitasking computer. This means you can start *Find* running in a Level II window, then press the CLEAR key over to another window and resume work

on another article or program while *Find* is searching.

To turn *Find* and *Diskdir* into more ideal background utilities calls for a two-step addition, which I'll discuss next month. Needed first is a system call to get the process number of *Find* while it is running. Then a second system call sets the priority of that process just a bit below the majority of the other processes running on the computer. A word processor, for example, will have a higher priority and continue to operate smoothly while *Find* chugs along faithfully in the background. Every few minutes you can press the CLEAR key to toggle over to the other screen and see if *Find* has located the missing file.

Why It's Slower

The procedures *Checkdir* and *Dodir* are the core modules in finding missing files or printing hierarchical listings of files on hard disk. They use a technique known in programming circles as *recursion*. While this means that the code published this month is shorter than normal, at the same time debugging a recursive program can be quite time-consuming. Yet it will be very cost-effective in the future, in terms of time saved while looking for missing files.

Recursion is very memory-intensive in some programs; however, that problem has not yet been found with *Find* and *Diskdir*. In fact, the 8K workspace requested by *RMB* appears to be plenty for these two programs.

To write a program like *Find* or *Diskdir* requires a way to look at all the directories on a disk. Since directories are stored as simple files, part of the solution is easy — simply open the directory file and read it. Reading the file, you will learn the names of all the other files in the directory.

The catch is when you suddenly realize that this list of files most likely contains the names of other directories. But do you

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know if one of these files is a directory? Unfortunately, OS-9 does not mark its directory files as directories. In fact, each directory entry, file or directory is identical. It contains a string that can be up to 29 characters long, followed by a three-byte-long logical-sector address that tells the operating system where it is stored on the disk.

Because this entry does not contain information telling you it is a directory, you must open each file to check it. The classic approach, taken by OS-9 programmers writing hierarchical directory utilities, has been to open the file, point to the logical sector number, calculate the location of the file-attribute byte within the file itself, seek to that location and then go get that byte. If the attribute indicates the file is a directory, the programmer then opens it and proceeds to the next task.

The problem with this approach is that it uses a lot of processor time to perform math required to calculate the location of the byte containing the attribute. The code required looks something like this:

```
attr_ptr=dir_rec.byte3*65536;.dir_rec.byte2*256+dir_rec.byte1
open #path, pathlist:read
seek #path, attr_ptr*256Get #path, attr
close #path
```

The calculations are no big deal if performed only occasionally. But when you perform them on each file of each disk (which can contain thousands of files)... you get the idea.

Our approach uses a bit of common sense and logic suggested by *WizPro* author Bill Brady. When he confronted the same problem while writing his *FMenu* routine within *WizPro*, he found if a file was a directory by attempting to change the current working directory to it. If he received an error from the system, he knew that he had tried to change the working directory to a file that is not a directory. If no error was received, it was a directory.

The core decision code in the programs looks like this:

```
3000 ON ERROR GOTO 3010
      en:=0
      CHD DirEntry
3010 en=ERR
      IF en = 0 THEN
        tempdir:="."
        DirLevel:=DirLevel+1
        RUN dodir(tempdir,DirLevel)
        CHD ".."
        DirLevel:=DirLevel-1
      ELSE \ It's a file !!
      ENDIF
```

After resetting the error flag in the line following Line 3000, I attempted to change

the directory to one with the name of the file just found. If it is a directory, the error code is zero and you can list its contents.

But before doing that, I increase the value of *DirLevel* by one. This value "pretty prints" the listing to show the level of the directory being listed.

How do you list the contents of a new directory? Simply run *Dodir* again. That's what is meant by *recursive*. It literally runs itself again when it needs to solve the problem at hand.

The Tricky Part

When you have a program that insists on running itself over and over again, you can wind up in deep trouble and quite confused if you don't tell it when to put the brakes on its inward attitude. This problem occurred early on because of the structure of an OS-9 directory.

If you open and read any OS-9 directory, you will always find two familiar names at the top of each list. Those entries are the parent and current directories and are not visible when running the OS-9 *Dir* utility command because the program skips them. However, when writing your own program to access a disk directory, you must take this into account. It is taken into account in just one line in the utilities *Checkdir* and *Dodir*:

```
IF DirEntry<>".\" AND DirEntry<>"" THEN
  AND DirEntry<>"" THEN
    PRINT TAB(DirLevel*5); DirEntry
  GOSUB 3000 \ REM Is file a directory,
  if so process it!
ENDIF
```

Essentially this line allows the printing of all filenames, except the parent and current directory, and anything marked with an asterisk (*). So what's this * all about?

The asterisk was the solution to a frustrating problem that ran our program around and around in circles until it was solved. The * is there because an OS-9 directory contains not only a listing of the name of each file it contains but also a listing of the name of every file ever held. This means that every file created and later deleted is still listed in an OS-9 directory.

Obviously you don't want these files listed. In addition, they drive the recursive logic in the program nuts. To understand what is going on, place a number of *PRINT* statements in your code to help debug it. At one point during development, I inserted five extra lines. My code looked like this:

```
PRINT "Returning from GoSub, adir is: "; adir
```



```

IF adir THEN
  RUN readdir(target,tempdir)
  PRINT "After running readdir re-
  cursively, adir is "; adir
  CHD "...
... etc

3000 ON ERROR GOTO 3010      en=0
  PRINT "We are looking at entry ";
  Hits(FEntryNum)
  PRINT "Our working directory be-
  fore the CHD is ";
  Shell "pwd"
3010 en:=ERR
  PRINT "Our error number is "; en
  IF en=0 THEN \ REM It's a directory
... etc

```

When we ran this code, we received a printout like this:

```

Returning from GoSub, adir is False
Returning from GoSub, adir is False
We are looking at the entry B09
Our working directory before the CHD
is /HQ/PROGS/B09
Our error number is 216
Returning from GoSub, adir is False
We are looking at the entry C
... etc.

```

Studying these lines tells you the course the program travels while it runs. When it doesn't show up where expected, you know to investigate. Eventually, I got to the bottom of things in this manner.

Two More Tricks

Two more questions deserve attention. First, how does BASIC9 handle parameter errors? The answer to this question is needed to make *Find* and *Dodir* act like OS-9 programs written in C or assembly language. Another question is how to kill the procedure smoothly after finding the file you are looking for. In the quest for these answers we also discovered a trick that tells which directory a file is located in and a way to remember the current data directory used when starting the program.

The answer to the parameter error handling is found by studying the code in Listing 1, *Find*. Here's the core:

```

ON ERROR GOTO 200
target:=temptarg
200 en:=ERR
IF en=56 THEN
  INPUT "Type ..."; target
ENDIF

```

The key is that *target* is a DIMensioned variable. However, *temptarg* is a parameter. If there is a Parameter Error (Error 56), then no memory has been allocated for it. This means that every time you access it in the program, the error signal appears. Because of this, you must set an error trap at each location where you plan to access a parameter to insure trapping the right one.

Killing a BASIC9 procedure smoothly is another interesting proposition. For example, the standard way for a user to abort from the program by pressing the BREAK key is to check for an Error Number 002, not 005 as you might think.

While 005 is the value of the BREAK key, it generates a Signal 2 that is fed back to BASIC9's error-trapping routine. You must look for the 002 error from the keyboard-abort-signal handler to get out of the program.

This raises another point where caution is required. When handling signals (i.e., a keyboard abort), you cannot debug the program from within BASIC9 itself. You must first pack the code and run it from the OS-9 Shell, where it will run under RunB. I first fell into this "gotcha" when working with mouse signals. But that was a year ago and it took me a while to figure out why the BREAK key was knocking me straight out of the program instead of following my error-trapping code. Beware.

To abort a procedure that runs by exercising other procedures (find running *checkdir*, for example), you must supply a Boolean parameter that passes back and forth between one procedure and the next. I used a parameter named *killit*. When a procedure returns with *killit* true, it immediately ends, carrying the value of the *killit* to the procedure that called it. Eventually it gets back to the top level where I use the *Chd* command to move back to the current working directory, in which I started. Then I exit the program.

The Pwd Trick

It takes a while to find how to store the path to a directory so you can return to it later. The OS-9 utility will do the job of reporting a location on the screen. But that isn't much good if it doesn't tell the program itself.

Since the code in *pwd* itself is recursive and quite complicated, I again searched for an easier way, deciding to use a temporary file. With BASIC9's *Shell* statement, I called OS-9 and ran *pwd*. Its output was directed to a file named *wdirtmp* or *tempwdir*. Unique names are used in case you run both programs at the same time.

After writing the directory name to the disk file, the file opens and reads into an OS-9 variable. The *Chd* command is used then, with this variable as a parameter. If you happen to run a RAM disk and store it there, it's nice and fast.

Perhaps you'll find other tricks to help you with these deceptively simple listings. Next month I plan to put a menu-based front end on them and maybe add an alternative format. Till then, keep on hacking.

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Listing 1: Find

```

PROCEDURE find
  0000  PARAM temterg,tempath:STRING
  0008  DIM target,pathname:STRING
  0016  DIM savedir,test:STRING
  0021  DIM path,en:BYTE
  002C  DIM killit:BOOLEAN
  0033
  0034  ON ERROR GOTO 100
  003A
  003B  killit:=FALSE
  0041  en:=0
  0048
  0049  SHELL "pwd > /dd/wdirtemp"
  005F
  0060 100 IF en=218 THEN
  006F    SHELL "del /dd/wdirtemp"
  0083    SHELL "pwd > /dd/wdirtemp"
  0099  ENDIF
  009B
  009C  OPEN #path,"/dd/wdirtemp"
  00B1  GET #path,savedir
  00BB  CLOSE #path
  00C1
  00C2  ON ERROR GOTO 200
  00C8
  00C9  target:=temterg
  00D1
  00D2 200 en=ERR
  00DB  IF en=2 THEN
  00E7    GOTO 400
  00EB  ENDIF
  00ED
  00EE  IF en=56 THEN
  00FA    INPUT "Type a few characters from the name of the file you need: "
          ,target
  013C  ENDIF
  013E
  013F  ON ERROR GOTO 300
  0145
  0146  pathname:=tempath
  014E
  014F 300 en=ERR
  0158  IF en=2 THEN
  0164    GOTO 400
  0168  ENDIF
  016A
  016B  IF en=56 THEN
  0177    INPUT "Type the path to the directory you would like to start in: "
          ,pathname
  018A  IF pathname="" THEN
  01C6    pathname:="/dd/"
  01D0  ENDIF
  01D2  ENDIF
  01D4
  01D5  RUN checkdir(target,pathname,killit)
  01E9
  01EA 400 CHD savedir
  01F2  SHELL "del /dd/wdirtemp"
  0206  END
  0208
  0209

```

Listing 2: Findit

```

PROCEDURE findit
  0000  DIM target,pathname:STRING
  0008  DIM savedir,test:STRING
  0016  DIM path,en:BYTE
  0021  DIM killit:BOOLEAN
  0028
  0029  ON ERROR GOTO 100
  002F

```



```

0030      SHELL "pwd > /dd/wdirtemp"
0046
0047 100 IF en=218 THEN
0056      SHELL "del /dd/wdirtemp"
006A      SHELL "pwd >/dd/wdirtemp"
007F      ENOIF
0081
0082      OPEN #parh,"/dd/wdirtemp"
0097      GET #path,savewdir
00A1      CLOSE #path
00A7
00AB      ON ERROR GOTO 200
00AE
00AF      INPUT "Type a few characters from the name of the file you need: "

,target
00F1      INPUT "Type the path to the directory you would like to search in: "

,pathname

0134
0135 IF pathname="" THEN
0141     pathname="/dd"
014B     ENOIF
014D
014E      RUN checkdir(target,pathname,killit)
0162
0163 200 CHD savewdir
016B      SHELL "del /dd/wdirtemp"
017F      END
0181
0182
0183

```

Listing 3: Diskdir

```

PROCEDURE diskdir
0000      PARAM temstartdir:STRING
0007      DIM savewdir,pathname:STRING
0012      DIM parh,DirLevel:BYTE
001D      DIM killit:BOOLEAN
0024
0025      ON ERROR GOTO 100
002B      en:=0
0033      killit:=FALSE
0039
003A      SHELL "pwd >/dd/tempwdir"
004F
0050 100 IF en=218 THEN
0060      SHELL "del /dd/tempwdir"
0074      SHELL "pwd >/dd/tempwdir"
0089      ENOIF
008B
008C      OPEN #path,"/dd/tempwdir":READ
00A3      GET #path,savewdir
00AD      CLOSE #path
00B3
00B4      ON ERROR GOTO 200
00BA
00BB      pathname:=temstartdir
00C3
00C4 200 en=ERR
00CE      IF en=16 THEN
00DB          pathname="/dd"
00E5      ENOIF
00E7
00E8      ON ERROR GOTO 300
00EE
00EF      DirLevel:=0
00F6
00F7      RUN dodir(pathname,DirLevel,killit)
010B
010C 300 CHD savewdir
0114      SHELL "del /dd/tempwdir"
012B      END
012A

```

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Listing 4: Checkdir

```

PROCEDURE checkdir
0000  PARAM target,pathname:STRING; killit:BOOLEAN
0011  TYPE record=fname(29):BYTE; lsn3,lsn2,lsn1:BYTE
0020  DIM fmentry:record
0030  DIM DirEntry:STRING(29)
0040  DIM index,CharCount:INTEGER
0050  DIM en,DirPath:BYTE
0060  DIM tempdir:STRING
0070  DIM adir:BOOLEAN
0080
0090  ON ERROR GOTO 3010
0100
0110  IF killit THEN END
0120  ENDIF
0130
0140  index=0
0150  en:=0
0160
0170  CHD pathname
0180  OPEN #DirPath,pathname:READ+DIR
0190  SEEK #DirPath,0
0200
0210  REPEAT
0220
0230  IF killit THEN END
0240  ENDIF
0250
0260  SEEK #DirPath,index \ GET #DirPath,fmentry
0270  IF fmentry.fname(1)=0 THEN
0280    DirEntry=""
0290  ELSE
0300    CharCount:=0
0310    DirEntry=""
0320
0330    REPEAT
0340      CharCount=CharCount+1
0350      DirEntry=DirEntry+CHR$(LAND(fmentry.fname(CharCount),
0360
0370      127))
0380    UNTIL fmentry.fname(CharCount)>127 OR CharCount=28
0390    DirEntry=DirEntry+""
0400  ENDIF
0410
0420  IF DirEntry<>"." AND DirEntry<> "." AND DirEntry<>"" THEN
0430
0440  IF SUBSTR(target,DirEntry)<>0 THEN
0450    PRINT DirEntry; " is in ";
0460    SHELL "pwd"
0470  ENDIF
0480  COSUB 3000
0490  REM Is file a directory? If so, process it !
0500  ENDIF
0510  index=index+32
0520  UNTIL EOF(#DirPath)
0530  CLOSE #DirPath
0540  END
0550
0560  3000 ON ERROR GOTO 3010
0570  en:=0
0580  CHD DirEntry
0590
0600  3010 en:=ERR
0610
0620  IF en=2 THEN
0630    killit:=TRUE
0640  END
0650  ENDIF
0660
0670  IF en=0 THEN \REM It's a directory
0680    tempdir=""
0690    RUN checkdir(target,tempdir,killit)
0700    CHD " ."
0710  ELSE \REM It's a file
0720  ENDIF
0730  RETURN
0740

```


Listing 5: Dodir

```

PROCEDURE dodir
  0000  PARAM pathname:STRING; DirLevel:BYTE; killit:BOOLEAN
  0013  TYPE record=fname(29):BYTE; lsn3,lsn2,lsn1:BYTE
  0031  DIM fmentry:record
  003A  DIM DirEntry:STRING[29].
  0046  DIM index,CharCount:INTEGER
  0051  DIM en,DirPath:BYTE
  005C  DIM tempdir:STRING
  0063
  0064  ON ERROR GOTO 3010
  006A
  006B  IF killit THEN END
  0075  ENDIF
  0077
  0078  en:=0
  007F  index=0
  0086
  0087  CHD pathname
  008C  OPEN #DirPath,pathname:READ+DIR
  0098  SEEK #DirPath,0
  00A1
  00A2  REPEAT
  00A4
  00A5    IF killit THEN END
  00AF  ENDIF
  00B1
  00B2  SEEK #DirPath,index \ GET #DirPath,fmentry
  00C6  IF fmentry.fname(1)=0 THEN
  00D7    DirEntry:=""
  00DF  ELSE
  00E3    CharCount:=0
  00EA    DirEntry=""
  00F1
  00F2    REPEAT
  00F4      CharCount=CharCount+1
  00FF    DirEntry=DirEntry+CHR$(LAND(fmentry.fname(CharCount),
  127))
  0115  UNTIL fmentry.fname(CharCount)>127 OR CharCount=28
  012D  DirEntry:=DirEntry+" "
  0138  ENDIF
  013A
  013B  IF DirEntry<>"" AND DirEntry<>"." AND DirEntry<>"" THEN

  0159    PRINT TAB(DirLevel*5); DirEntry
  0166    GOSUB 3000
  016A
  016B    REM Is file a directory? If so, process it
  0195  ENDIF
  0197
  0198    index:=index+32
  01A3  UNTIL EOF(#DirPath)
  01AC
  01AD  CLOSE #DirPath
  01B3  PRINT \ PRINT \ PRINT
  01B9  END
  01BB
  01BC 3000 ON ERROR GOTO 3010
  01C5  en:=0
  01CC  CHD DirEntry
  01D1
  01D2 3010 en:=ERR
  01DB
  01DC  IF en=2 THEN
  01E8    killit:=TRUE
  01EE  END
  01F0  ENDIF
  01F2
  01F3  IF en=0 THEN \REM It's a directory
  0212    tempdir:= "."
  021A    DirLevel:=DirLevel+1
  0225    RUN dodir(tempdir,DirLevel,killit)
  0239    CHD "."
  023F    DirLevel:=DirLevel-1
  024A  ELSE \REM It's a file
  025C  ENDIF
  025E  RETURN
  0260

```

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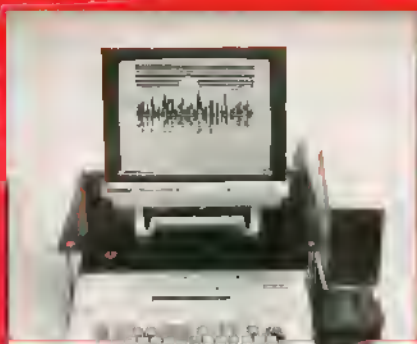


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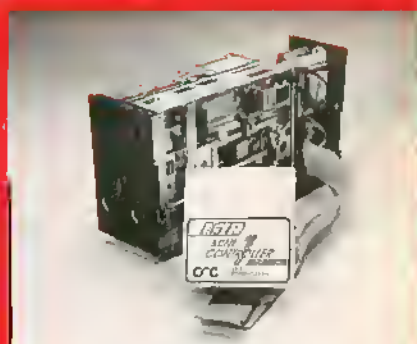
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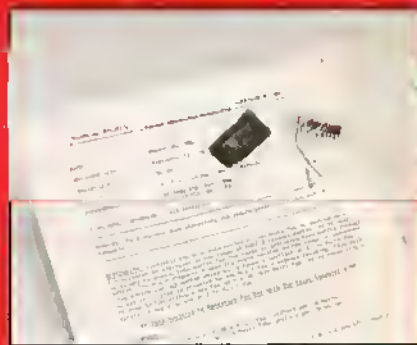
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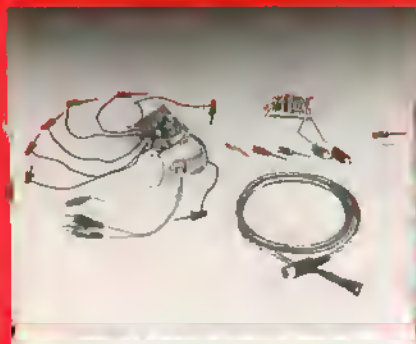
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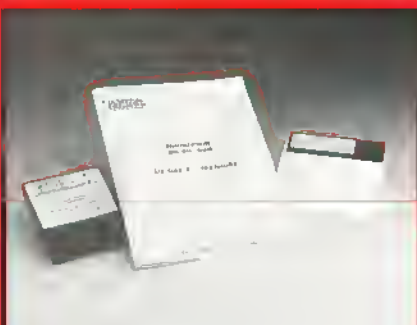
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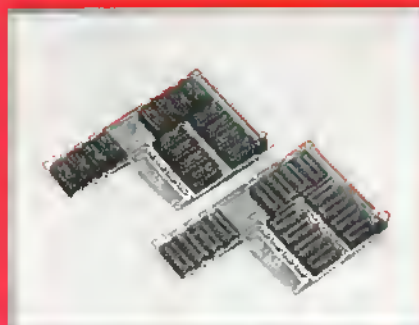
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